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ACU
Networked Intelligent Controllers User Guide

GE Security • 791 Park of Commerce Boulevard • Suite 100 • Boca Raton • Florida • 33487 • (561) 998-6100
www.GESecurity.com

REVISION STATUS

Description		Date Revised
Rev G		
Added SPS5 Power Supply		September 15, 2002
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Modification to Table 3-25 for ACURS TB10 February 12, 2004
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Added server external dial-up modem installation on page 3-16

Rev H.3

Added Surface Mount RRE02-E1L on page 5-2 March 29, 2004
Chapter 5 was completely reorganized to make less confusing and some duplicate material was removed from the manual. March 29, 2004

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Added Surface Mount RIM16-E1L on Page 6-1.
Added Figure 6-1 Surface Mount RIM16-E1L Board Layout.
Added Table 6-7 Surface Mount RIM16-E1L Switch SW1 settings.
Added Table 6-8 Surface Mount RIM16-E1L Switch SW2 for RS485 termination.
Added Table 6-9 Surface Mount RIM16-E1L Switch SW3 for Input zone termination.
Added Table 6-10 Surface Mount RIM16-E1L Jumper W1 and W2 to select power for relays K1 and K2.
Added Table 6-12 Surface Mount RIM16-E1L Operation LEDs.
Added Surface Mount RRM16-E1L Board on page 7-2.
Added Figure 7-1 Surface Mount RRM16-E1L Board Layout.
Added Table 7-10 Surface Mount RRM16-E1L Switch SW2 Settings.
Added Section on new Surface Mount RRE02-E00 and RRE04-E00 on page 5-2.
Added Information for Flashing PROMs on page 9-13.
Modified Termination Tables Table 3-15 and Table 3-16.
Modified Termination Table Table 6-9.
Modified General Specifications Tables Table 1-5, Table 1-6, Table 1-7 and Table 1-8.

Rev H.5

Added information to reference note below Table 6-9 June 9, 2004
Correction to Note above Table 6-9
Correction to Table 5-16

Rev H.6

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Correction to Table 5-16
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Rev H.7

Updated drawings and table references for the Remote Modules October 5, 2004
Updated references to GE Security

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Added Reference Table with Model Number changes, see Table A-13 July 29, 2005
Added information about the Altronix Power Distribution Board. See page 2-18
Corrected drawing of the ACURS2 and ACURS4 to show Power Distribution Board. See page 3-27
Moved current products to the front of Chapter 3 and legacy information to the back of the chapter.
Added information about the New surface mount technology RMS/RPX Reader
Added information required for CE certification

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WARNING

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case users at their own expense will be required to take whatever measures may be required to correct the interference.

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TO THE READER

The Part 68 rules require that the following information be provided to the end user of equipment containing a pre-approved modem module.

Type of Service:

GE Security Software operated on an ACU2 field panel is designed for use on standard device telephone lines. It connects to the telephone line by means of a standard jack called the USOC RJ-11C (or USOC FJ45S.) Connection to telephone company provided coin service (central office implemented systems) is prohibited. Connection to party line services is subject to state tariffs.

Telephone Company Procedures:

The goal of the telephone company is to provide the best service it can. In order to do this, it may occasionally be necessary for them to make changes in their equipment, operations or procedures. If the possibility exists that these changes may affect the customer's service or the operation of the equipment, the telephone company will provide written notice so that any changes necessary to maintain uninterrupted service may be made.

In certain circumstances, it may be necessary for the telephone company to request information from you concerning which equipment you have connected to your telephone line. Upon request of the telephone company, provide the FCC registration number and the Ringer Equivalence Number (REN); both of these items are listed on the equipment label. The sum of all the RENs on your telephone line should be less than five in order to assure proper service from the telephone company. In some cases, a sum of five may not be usable on a given line.

If Problems Arise:

If any of your telephone equipment is not operating, you shouldimmediately remove it from your telephone line, as it may cause harm to the telephone network. If the telephone company notes a problem, they may temporarily discontinue service. When practical, they will notify you in advance of this disconnection. If advanced notice is not feasible, you will be notified as soon as possible. When you are notified, you will be given the opportunity to correct the problem and informed of your right to file a complaint with the FCC. Contact your telephone company if you have any questions about your phone line. In the event repairs are ever needed on an GE Security ACU2 field panel, they should be performed by a quiflied GE Security representative. For information contact:

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Chapter 1

Introduction

About This Manual

This manual contains instructions for:

- Unpacking
- Packing
- Returning Equipment
- Installing
- Testing
- Maintaining ACU Components
- UL Specifications

FCC Registration

This equipment complies with the requirements in Part 15 of the FCC Rules for a Class A computing device. Operation of this equipment in residential area may cause unacceptable interference to radio and TV reception requiring the operator to take whatever steps are necessary to correct the interference.

UL Standards

The following GE Security equipment is listed for the following Underwriters Laboratories Standards; UL 1076 and UL 294;

- SAPPHIRE Pro, DIAMOND, DIAMOND II and ONE-32 PLUS Host Computers
- ACU2, ACU2X, and ACUXL Controllers
- ACU Enclosure with ACU2-PS4, ACU-5APWR, and ACU-8APWR power supplies.
- ACU-R2 and ACU-R4 Controllers
- ACU One Stage Reader IGR-RMS2WG or B (RMS-1, RMS-2, RWE-1, RWE-2, RPX-1, RPX-2) Remote Reader Electronics and RRE HP configuration RRE0, 1, 2. 2A, and 4 (Part Numbers RRE01-E00, RRE01-E1L, RRE02-E00, RRE02-E1L, RRE04-E00 AND RRE04-E1L)
- Integrated Keypad Electronics (Part Number IKE-00RDIGW)
- Remote Input Modules (RIM) (Part Numbers RIM16-E00 & RIM16-E1L)
- Remote Relay Modules (RRM16-E00) (Part Numbers RRM16-E00 & RRM16-E1L)
- Remote Module Enclosure with power supply (REN and REND)
- Keypads IGR-K11NLWG and IGR-K11WLGW (K-10, K-10L, K-10P, K-10LP, K11)
- Read Heads RMS-10 and RWE-12 (RPP2-50, RPP2-54, RPP2-56, RPP2-58, RPP2-60)
- HID ProxPro Model 5355 with and without keypad
- HID ProxPoint Model 6005
- MiniProx Model 5365
- Thin Line II Model 5395
- Magstripe Extender (Part Number IGR-RMSMAG-EXT)

NOTE: Any reader or keypads other than the ones listed are not to be used on a UL listed system.

UL Specifications

In order to comply with UL 1076 and/or UL 294 the following items must be adhered to, if these conditions are not met, the installation will be in violation of the UL requirements.

UL Installations with ACUs communicating on a LAN must utilize TDES (Triple DES Encryption).

Only UL listed equipment may be connected to the GE Security system. This includes external power supplies, motion detector, door contacts, enclosures, etc.

With reference to Table 3-48 through Table 3-52 the maximum current drawn from TB1-4 and TB5-3 must not exceed a total of 0.25 amps.

With reference to Table 3-49 the maximum current drawn from each reader port must be limited to 1.25 amps.

With reference to Table 4-11, Table 4-12 and Table 4-15 the following applies: “If the card reader is in an unprotected area the door strike must be controlled by the ACU-2.”

The End-Of-Line resistor must be located within the alarm zone sensor enclosure.

Shielded cables must be used for all communication and read head runs.

The temperature range for UL listed sites is 0 to 65 degrees C.

FOR YOUR SAFETY

The following **WARNINGS:** and **CAUTIONS:** appear here for your safety. They are general in nature and do not pertain to specific procedural steps. There are, however, additional safety precautions that do pertain to specific procedural steps. These precautions appear at the point in the installation and/or maintenance procedures where a hazard is most likely to be encountered.

BE SURE to read and follow all personal safety **WARNINGS** and equipment **CAUTIONS** appearing in this document PRIOR to beginning ACU installation.

Warning:

Be sure to observe battery manufacturer's instructions:

Danger Explosive Gases

- Can cause blindness or severe injury.
- Use in a well-ventilated area away from open flame, cigarettes, sparks, and other sources of ignition.
- Shield eyes and face when working around battery.
- Do not make direct contact between the positive and negative terminals.
- Do not puncture, disassemble or incinerate battery.
- Dispose of in accordance with environmental regulations.

Poison - Contains lead compounds and corrosive acid

- Contains sulfuric acid and can cause sever burns. In the event of contact flush with water and obtain immediate medical attention.

Keep out of reach of Children

Re-Charge in accordance with manufacturer’s instructions

Warning:

The ACU components described in this manual contain electrical shock hazard potential. Only qualified personnel should perform installation and maintenance. An electrical disconnect device must be included as part of the building wiring. Make certain that the power is turned off in the area you will be working before proceeding with installation or service of the ACU.

Warning:

Make certain that the AC power source circuit breaker(s) is OFF BEFORE proceeding. Failure to heed this **WARNING:** can cause damage to unit(s).

Warning:

The ACU components described in this manual contain electrical shock hazard potential. Only qualified personnel should perform installation and maintenance. An electrical disconnect device must be included as part of the building wiring. Make certain that the power is turned off in the area you will be working before proceeding with installation or service of the ACU.

Warning:

Do not use the ACU Controller, Remote Reader Electronics, Remote Input Module or Remote Relay Module to switch any voltage above 30 volts. Failure to heed this WARNING can cause death, personal injury or damage to unit(s).

CAUTION:

The ACU controllers must have separate conduit run to each enclosure. Only cables/wires that begin or terminate in the enclosure should run into the enclosure. DO NOT use the enclosure(s) as "pull-boxes" for any foreign wiring. The enclosures should be arranged for separate conduit runs.

NOTICE: Fire Safety Notice

Warning:

NEVER connect any card reader devices or locks onto doors, gates or barriers that may be fire exits without first consulting and getting approval of applicable local officials. Use of push buttons to exit may be illegal. Single action exit may be required. Obtain proper permits and approvals in writing before installation.

System Overview Diagram

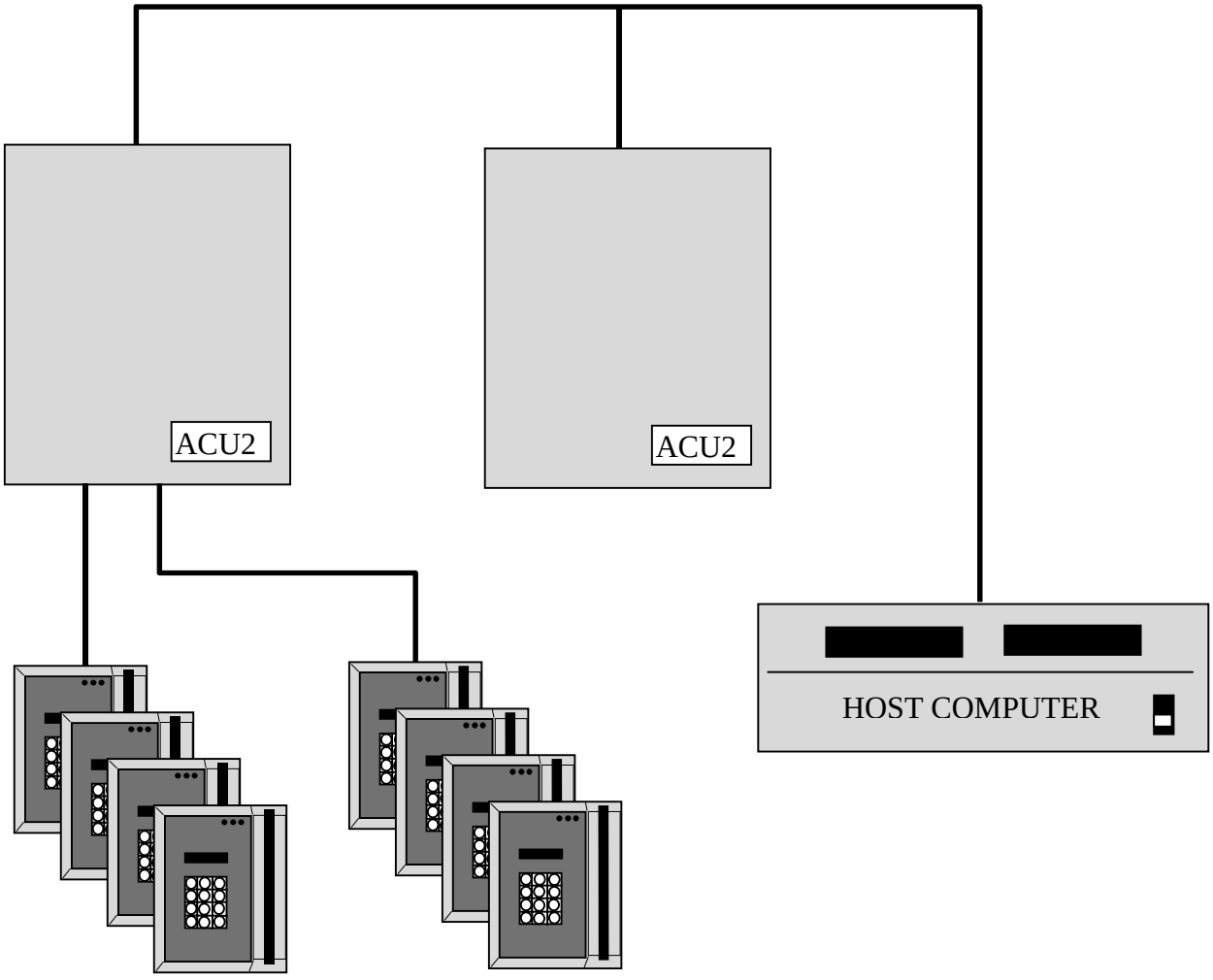


Figure 1-1: System Overview

System Overview

The ACU controllers are intelligent, remote, state-of-the-art units for access control, alarm monitoring and output control. The ACU controllers incorporate two card reader ports. Each port can control four card readers (see Section 2) multi-dropped using an RS-485 interface. The ACU controller includes 12 supervised alarm inputs and 12 relay outputs, all user-configurable as to function and reporting format. Optional on-board DES Encrypted communication is available.

ACU Controller

The ACU Controller consists of a Printed Circuit Board (PCB) Controller Assembly (a single processor board) with optional battery backup. The processor is a 20-MHz 68008 with a minimum of 4-Mbytes RAM expandable to 4-Mbytes. Program memory consists of 64 Kilobytes EPROM.

Reader communication is non-encrypted polled serial protocol up to 4000 ft. (1220 m) for the One-Stage Readers and remote modules.

We provide alarm monitoring by 12 UL grade-A supervised inputs, cabinet tamper inputs and power loss inputs. The supervised inputs may also be configured for exit push button and door contact inputs for the card readers.

Twelve relays with form-C contacts are provided for strike activation and/or remote control.

DIP switches and a rotary device-polling address switch are available for user configuration.

Communication to the host computer is either RS-232, RS-485, or over a LAN system. It has been evaluated by UL to meet Grade-AA requirements in UL 1076. A dual reporting path configuration is available.

Readers

The ACU Controller supports the reader communication protocol. The ACU Controller polls each reader for card data or status changes constantly.

Six wires are required for, transmit data, receive data, power, and ground. Six additional wires are required (two for door contact monitor, two for door strike and two for exit push button).

Each ACU Controller port supports four readers with the address set on the reader DIP switch, i.e., readers 0 to 3 (addresses 0 to 3) are on reader port 1 and readers 4 to 7 (addresses 0 to 3) are on reader port 2.

Each ACUXL/16 Controller port supports eight readers with the address set on the reader DIP switch, i.e., readers 0 to 3 and 8 to 11 (addresses 0 to 3 and 8 to 11) are on reader port 1 and readers 4 to 7 and 12 to 15 (addresses 0 to 3 and 12 to 15) are on reader port 2.

Access Control

The ACU Controller provides local access request processing using the data base downloaded from the host computer. ACU Readers can be operated as a single reader with exit push button or in a paired reader configuration. The door strike and door held open times are user-configurable.

Access alarms consist of door forced open, door held open, reader tamper and reader off-line. Uses have the ability to mask all alarms.

Alarm Monitoring

Alarm zone monitoring allows the system to monitor 12 intrusion detection zones on the ACU Controller, four zones on each ACU Reader and 16 zones on the Remote Input Module. Each zone is a UL Grade-A, two-wire supervised circuit for monitoring alarm detection devices, such as ultrasonic motion detectors. Four trouble conditions may be detected:

Open loop
Shorted loop
Grounded loop
Line fault

Cabinet tamper and power fail inputs are always monitored. Door forced open, door held open, reader off-line and reader tamper alarms are also reported to the host.

Remote Control

Relays may be activated by commands from the host system, by an access cycle to control the door strike, by Local Alarm Output Command or by a Local Relay Command. Twelve relays are available on the ACUXL. They are type form-C dry contact. Sixteen relays are available on the Remote Relay Module. They are type form-C dry contact. Two form-C dry contact relays are available on the Remote Reader Electronics, the One-Stage HP Reader and Remote Input Module. Since the relays are used for door strikes and outputs, the ACU Controller will accept both door strike commands and user-activated relay commands designated to the same relay.

The relay contacts are rated at 30 volts AC/DC at 2 amps maximum.

The “DS” output on the one-stage reader is rated at 28 VDC at 1 amp maximum.

Unpacking, Packing and Returning Instructions

The following is a step-by-step procedure for unpacking, inspecting and returning any of the ACU System equipment.

CAUTION:

Prior to handling ACU System components, be sure to follow the two rules below to avoid damaging the IC's by static electricity.

1. Handle all static-sensitive components at a static safeguarded work area.
2. Transport all static-sensitive components in static-shield containers or packages.

Unpacking Procedure

NOTE: If any damage to the shipment is noticed BEFORE unpacking, a claim MUST be filed with the commercial carrier immediately.

All containers should be opened and unpacked carefully in order to prevent damage to the contents.

The shipment bill of materials is in an envelope taped to one of the containers in the shipment.

The following procedure is used to unpack the ACU System components in preparation for installation:

1. Open the container and remove the unit and all packing material. Retain the container and all of the packing material. They can be used again for reshipment of the component, if required.
2. Inspect the container contents for shortages. If any items are missing, contact GE Security Customer Service.
3. Visually check the condition of the unit. If damage or defect is discovered, perform the following;
   - If the damage was caused in transit, a claim MUST be filed with the commercial carrier.
   - If any other defect is apparent, proceed as described in "Packing Instructions" and "Returning Procedure" below.

Packing Instructions

Printed circuit boards may be shipped in anti-static packing material, available directly from GE Security. The following procedure is used to pack the ACU System components.

NOTE: Carefully pack the defective component using either the original or spare component container and packing material. Wrap Printed Circuit Boards in anti-static packing material. Plastic bags and white foam peanuts are unacceptable packing materials.

Return the component to GE Security, as described in "Returning Procedure".

Returning Procedure

The following procedure is used to return any equipment to GE Security.

1. Contact GE Security Customer Repairs in advance of returning the equipment. The telephone number is (800) 800-2626 and FAX is (828) 324-4185. They are located at 1510 Tate Boulevard, SE., Hickory, North Carolina 28603

When you call, please have available:

- The GE Security part number and the serial number of the equipment.

- A description of the problem or reason you are returning the equipment.
- Purchase order number that the repair is to be billed if the equipment is not under warranty.

2. Obtain a Return Authorization (RA) Number from Customer Support. Be sure to reference the RA Number on all communications concerning the returned equipment.
3. Mark the RA Number on all containers returned to GE Security.

NOTE: Parcels that are not marked with an RA Number will be delayed for repair processing at GE Security and may be returned at sender's expense.

4. Pack (carefully) and return the equipment to GE Security.

General Specifications

This section provides general specifications for the various hardware components used to construct a typical access control/alarm monitor security system. This includes the dimensions, weight, environmental requirements and power limitations. The specifications are for hardware components that are currently available through GE Security are listed first. They include the ACU-XL16, ACURS2, and ACURS4 controllers; the RMS2 and 10 along with the IKE readers; and the various remote modules.

ACUXL-16 Networked Intelligent Controller

Characteristic	Specifications
DIMENSIONS	
HEIGHT	20.12 in (51.1 cm)
WIDTH	16.50 in (41.9 cm)
DEPTH	5.00 in (12.7 cm)
WEIGHT	
WITH BATTERIES	45 lb. (20.4 kg) With 4 Amp Power Supply 62 lb. (28.1 kg) With 8 Amp Power Supply
WITHOUT BATTERIES	33 lb. (15.0 kg) With 4 Amp Power Supply 38 lb. (17.2 kg) With 8 Amp Power Supply
ENVIRONMENTAL	
MAXIMUM TEMPERATURE	+150°F (+65°C)
MINIMUM TEMPERATURE	+32°F (0°C)
HUMIDITY	0 to 95% Relative (non-condensing)
INPUT POWER VOLTAGE	100/240 VAC, 50/60 Hz
MAX INPUT CURRENT	6.0 Amp maximum with the 8 Amp Power Supply 3.0 Amp maximum with the 5 Amp Power Supply
DC STANDBY BATTERY BACKUP (OPTIONAL)	4-Hour Backup

Table 1-1: General Specifications ACUXL-16 Networked Intelligent Controller

ACUXL-16 comes standard with the 8 Amp power supply and requires four 7 Amp hour batteries for battery backup.

ACURS2 and ACURS4 Networked Intelligent Controller

Characteristic	Specifications
DIMENSIONS	
HEIGHT WIDTH DEPTH	20.12 in (15.1 cm) 16.5 in (41.9 cm) 5.0 in (12.7 cm)
WEIGHT	
WITH BATTERIES WITHOUT BATTERIES	45 lb. (20.4 kg) 33 lb. (15.0 kg)
ENVIRONMENTAL	
MAXIMUM TEMPERATURE MINIMUM TEMPERATURE HUMIDITY	+150°F (+65°C) +32°F (0°C) 0 to 95% Relative (non-condensing)
INPUT POWER VOLTAGE	100/240 VAC, 50/60 Hz, 3.0 Amp maximum current
DC STANDBY BATTERY BACKUP	4-Hour Backup

Table 1-2: General Specifications ACURS2 and ACURS4 Networked Intelligent Controller

ACU2 and ACU2X Networked Intelligent Controller

Characteristic	Specifications
DIMENSIONS	
HEIGHT WIDTH DEPTH	20.12 in (51.1 cm) 16.50 in (41.9 cm) 5.00 in (12.7 cm)
WEIGHT	
WITH BATTERIES WITHOUT BATTERIES	45 lb. (20.4 kg) With 4 Amp Power Supply 62 lb. (28.1 kg) With 8 Amp Power Supply 33 lb. (15.0 kg) With 4 Amp Power Supply 38 lb. (17.2 kg) With 8 Amp Power Supply
ENVIRONMENTAL	
MAXIMUM TEMPERATURE MINIMUM TEMPERATURE HUMIDITY	+150°F (+65°C) +32°F (0°C) 0 to 95% Relative (non-condensing)
INPUT POWER VOLTAGE	120/240 VAC, 50/60 Hz
MAX INPUT CURRENT	2.0 A, 240 W @ 120 VAC (8 Amp Power Supply) 1.0 A, 240 W @ 240 VAC (8 Amp Power Supply) 1.0 A, 120 W @ 120 VAC (4 Amp Power Supply) 0.5 A, 120 W @ 240 VAC (4 Amp Power Supply)
DC STANDBY BATTERY BACKUP (OPTIONAL)	4-Hour Backup

Table 1-3: General Specifications ACU2 and ACUX Networked Intelligent Controller

ACU16 comes standard with the 8 Amp power supply and requires four 7 Amp hour batteries for battery backup.

ACU-R2 Networked Intelligent Controller

Characteristic	Specifications
DIMENSIONS	
HEIGHT WIDTH DEPTH	20.12 in (51.1 cm) 16.50 in (41.9 cm) 5.00 in (12.7 cm)
WEIGHT	
WITH BATTERIES WITHOUT BATTERIES	45 lb. (20.4 kg) 33 lb. (15 kg)
ENVIRONMENTAL	
MAXIMUM TEMPERATURE MINIMUM TEMPERATURE HUMIDITY	+158°F (+70°C) +32°F (0°C) 0 to 95% Relative (non-condensing)
INPUT POWER VOLTAGE	120/240 VAC, 50/60 Hz
MAX INPUT CURRENT	2.0 A, 240 W @ 120 VAC (8 Amp Power Supply) 1.0 A, 240 W @ 240 VAC (8 Amp Power Supply) 1.0 A, 120 W @ 120 VAC (4 Amp Power Supply) 0.5 A, 120 W @ 240 VAC (4 Amp Power Supply)
DC STANDBY BATTERY BACKUP (OPTIONAL)	4-Hour Backup

Table 1-4: General Specifications ACU-R2 Networked Intelligent Controller

ACU-R4 Networked Intelligent Controller

Characteristic	Specifications
DIMENSIONS	
HEIGHT WIDTH DEPTH	20.12 in (51.1 cm) 16.50 in (41.9 cm) 5.00 in (12.7 cm)
WEIGHT	
WITH BATTERIES WITHOUT BATTERIES	45 lb. (20.4 kg) 33 lb. (15 kg)
ENVIRONMENTAL	
MAXIMUM TEMPERATURE MINIMUM TEMPERATURE HUMIDITY	+158°F (+70°C) +32°F (0°C) 0 to 95% Relative (non-condensing)
INPUT POWER VOLTAGE	120/240 VAC, 50/60 Hz
MAX INPUT CURRENT	2.0 A, 240 W @ 120 VAC (8 Amp Power Supply) 1.0 A, 240 W @ 240 VAC (8 Amp Power Supply) 1.0 A, 120 W @ 120 VAC (4 Amp Power Supply) 0.5 A, 120 W @ 240 VAC (4 Amp Power Supply)
DC STANDBY BATTERY BACKUP (OPTIONAL)	4-Hour Backup

Table 1-5: General Specifications ACU-R4 Networked Intelligent Controller

One-Stage Reader

Characteristic	Specifications
DIMENSIONS	
HEIGHT WIDTH DEPTH	7.625 in (19.4 cm) 6.125 in (15.6 cm) 2.0 in (5.1 cm)
WEIGHT	2.25 lb. (1.02 kg)
ENVIRONMENTAL	
MAXIMUM TEMPERATURE * MINIMUM TEMPERATURE HUMIDITY HUMIDITY (Weatherproof model)	+158°F (+70°C) +32°F (0°C) 0 to 95% (non-condensing) 0 to 95%
POWER	
VOLTAGE MAXIMUM CURRENT	+24 VDC (±15%) 115 mA

Table 1-6: General Specifications One-Stage Reader

NOTE: Readers with LCD display are limited to a Maximum Temperature of 122°F (0 to 50°C).

Remote Module Enclosure

Characteristic	Specifications
DIMENSIONS	
HEIGHT	12.0 in (30.5 cm)
WIDTH	12.0 in (30.5 cm)
DEPTH	4.0 in (10.2 cm)
WEIGHT	12.5 lb. (5.5 kg)

Table 1-7: General Specifications Remote Module Enclosure

- Two RREs can fit into one Remote Module Enclosure (ACU-ENCRM).
- One RIM or one RRM can fit into one Remote Module Enclosure.
- One RRE04 can fit into one Remote Module Enclosure.
- One Master with one RS485 4-Port Expander board can fit into Remote Module Enclosure.

Remote Modules

Remote Reader Electronics RRE-HP and RRE Surface Mount

Characteristic	Specifications
ENVIRONMENTAL	
MAXIMUM TEMPERATURE	+158°F (+70°C)
MINIMUM TEMPERATURE	+32°F (0°C)
HUMIDITY	0 to 95% (non-condensing)
POWER	
VOLTAGE	+24 VDC (±15%)
OPERATING CURRENT *	60 mA Maximum (less read head & LED current)

* Add 0.013 amps for each energized relay.

Table 1-8: General Specifications RRE Remote Reader Electronics

NOTE: See Table A-13 for part numbers for all remote model options.

Remote Reader Electronics RRE-2 and RRE-4 Surface Mount

Characteristic	Specifications
ENVIRONMENTAL	
MAXIMUM TEMPERATURE	+158°F (+70°C)
MINIMUM TEMPERATURE	+32°F (0°C)
HUMIDITY	0 to 95% (non-condensing)
POWER	
VOLTAGE	+24 VDC (±15%)
OPERATING CURRENT *	160 mA Maximum (less read head & LED current)

* Add 0.013 amps for each energized relay.

Table 1-9: General Specifications RRE-2 and RRE-4 Remote Reader Electronics

RIM Remote Input Module and RIM Surface Mount

Characteristic	Specifications
ENVIRONMENTAL	
MAXIMUM TEMPERATURE	+158°F (+70°C)
MINIMUM TEMPERATURE	+32°F (0°C)
HUMIDITY	0 to 95% (non-condensing)
POWER	
VOLTAGE	+24 VDC (±15%)
OPERATING CURRENT *	140 mA

* Add 0.013 amps for each energized relay.

Table 1-10: General Specifications RIM Remote Input Module

NOTE: See Table A-13 for part numbers for all remote model options.

RRM Remote Relay Module - Surface Mount Technology

Characteristic	Specifications
ENVIRONMENTAL	
MAXIMUM TEMPERATURE MINIMUM TEMPERATURE HUMIDITY	+158°F (+70°C) +32°F (0°C) 0 to 95% (non-condensing)
POWER	
VOLTAGE OPERATING CURRENT *	+24 VDC (±15%) 40 mA

* Add 0.013 amps for each energized relay.

Table 1-11: General Specifications Remote Relay Module

NOTE: See Table A-13 for part numbers for all remote model options.

IKE Keypad

Characteristic	Specifications
DIMENSIONS	
HEIGHT WIDTH DEPTH	5.125 in (13.00 cm) 4.0 in (10.16 cm) 1.75 in (4.45 cm)
WEIGHT	1.0 lb. (1.02 kg)
ENVIRONMENTAL	
MAXIMUM TEMPERATURE * MINIMUM TEMPERATURE HUMIDITY	+158°F (+70°C) +32°F (0°C) 0 to 95% (non-condensing)
POWER	
VOLTAGE MAXIMUM CURRENT	+24 VDC (±15%) 60 mA

Table 1-12: General Specifications IKE Keypad (IKE-00RDIGW)

NOTE: Readers with LCD display are limited to a Maximum Temperature of 122°F (0 to 50°C).

RS485 4-Port Expander

Characteristic	Specifications
ENVIRONMENTAL	
MAXIMUM TEMPERATURE MINIMUM TEMPERATURE HUMIDITY	+158°F (+70°C) +32°F (0°C) 0 to 95% (non-condensing)
POWER	
VOLTAGE MAXIMUM CURRENT With Add-on card Total MAXIMUM CURRENT	+24 VDC (±15%) 40 mA 60 mA

Table 1-13: General Specifications RS485 4-Port Expander

REN Reader Enclosure

Characteristic	Specifications
DIMENSIONS	
HEIGHT WIDTH DEPTH	20.12 in (51.1 cm) 16.5 in (41.9 cm) 5.0 in (12.7 cm)
WEIGHT	19.5 lb. (9 kg)

Table 1-14: General Specifications of REN

- Two RIM16-E1Ls and two RRM16-E1Ls or four RRM16-E1Ls can fit into one REN Enclosure (ACU-ENC-NEMA12).

Currents for Devices

Model #	Description	Operating Current
ACU-XL16	Networked Intelligent Controller	24vdc @ 0.275
ACURS2	Networked Intelligent Controller	24vdc @ 0.275
ACURS4	Networked Intelligent Controller	24vdc @ 0.275
IGR-RMS2WG or B	Mag Stripe Reader (either Gray or Beige)	24vdc @ 0.070
RPX	Prox Reader	24vdc @ 0.090
RRE	Remote Reader Electronics SMT *	24vdc @ 0.060
RRE04	Remote Reader Electronics-4 SMT *	24vdc @ 0.160
RRE02	Remote Reader Electronics-SMT *	24vdc @ 0.050
RIM	Remote Input Module SMT *	24vdc @ 0.140
RRM	Remote Relay Module SMT *	24vdc @ 0.040
ACU-Modem	ACU-Modem Card	5vdc @ 0.150
ACU-LAN-KIT	ACU-Local Area Network Card	5vdc @ 0.100
ACU-NCEX4	RS485 Hub Expander – Master **	24vdc @ 0.040

* Add 0.013 amps for each energized relay.
** Master with Add-on expander card add 0.020 amps

Table 1-15: Typical Operating Currents for Devices

NOTE: For specifications on OEM readers see the reader's manufactures specifications enclosed with the reader.

Chapter 2

Installation

Guarding Against Lightning Damage

Lightning can do a great deal of damage to electronic equipment. Adhering to the following guidelines will significantly reduce equipment damage resulting from lightning.

Avoid running wiring across or near to any lightning rod grounding wires. Also, avoid running wiring near any cable or wires connected to an outside TV or radio antenna.

Make sure to ground the ACU controller enclosure, carefully following GE Security instructions.

The preferred ground is an 8 ft. (2.5 m) copper rod driven into the earth as near to the equipment location as possible.

The second choice of ground is a copper cold water pipe. An insulated junction at the water meter MUST NOT isolate the pipe. DO NOT use hot water, radiator, gas piping or plastic plumbing pipes.

The third and least desirable ground is the building electrical system ground wire.

Use at least AWG 12 copper wire for grounding.

Choose the grounding location that makes the shortest and most direct path to ground. Minimize the length of the wire and avoid all types of turns in the ground return path.

Ground all external mounted enclosures/housings (such as used for readers, gate controls, etc.) to reduce the risk of damage to the equipment.

The entire alarm and/or access system should be tested, at least once a year, to ensure that lightning damage has not gone undetected.

Grounding must be in accordance with the National Electrical Code (NEC), Article 250 and state and local codes.

Grounding Connections

It is important to connect each ACU panel on the communication loop individually to earth ground, not to chassis or electrical ground. Grounding is imperative for proper data communications between panels and to ensure full functionality of the lighting and transient voltage protection devices. Voltage protection devices are designed into all ACU panels and will channel most transient surges to ground if the panel is properly connected to earth ground. If the panels are not properly connected to ground, the surge suppression devices may not function and data communications may be erratic.

For proper grounding all ACUs should be connected to earth ground, not to chassis or electrical ground.

Cold water pipes or a grounding rod usually make a good earth ground. The grounding wire should be as heavy as possible with as short and straight a run as possible. Avoid sharp bends in the wire because a large power surge might arc across the board.

Recommended Grounding Sources

- Cold Water Earth Ground
- Building Ground
- Electrical Ground

The GE Security system should use a consolidated earth ground, in which the public utilities and the security system ground rods are bonded together. A consolidated earth ground eliminates the problem of step voltage blowout, in which measurable voltage potential exists between earth ground rods, resulting in a current flow path and damage to the system during a lighting strike.

It is recommended that 12 AWG wire be used to connect the earth ground in the shortest and straightest path possible. Avoid sharp turns and use a minimum radius of eight inches (203 mm) for bends. Ground wires should be run separate from other wires and be routed toward the earth. Use of eight-foot (2.4 m) copper clad ground rod is recommended.

Installing The ACU Enclosure

CAUTION:

THE ACU CONTROLLERS MUST HAVE SEPARATE CONDUIT RUN TO EACH ENCLOSURE. Only cables/wires that begin or terminate in the enclosure shall be run into the enclosure. DO NOT use the enclosure(s) as "pull-boxes" for any foreign wiring. The enclosures should be arranged for separate conduit runs.

Refer to Figure 2-1 for the identification of the components mounted inside the ACU controller enclosure. (ACU-ENC-NEMC12) The installation procedure for the ACU controller enclosure is the same whether or not the controller is fully assembled or disassembled.

1. Place the enclosure in desired position (the ground lug in the lower right-hand corner - door hinge to the left) and mark holes.
2. Mount enclosure to wall using proper mounting hardware for type of wall construction.
3. Punch the applicable knockouts and connect the required conduits to the knockout holes.
4. Assemble the ACU controller as follows (if your ACU controller was shipped assembled, disregard this step).
   a. Remove the hex nuts and split lock washers from the studs in the back of the enclosure.
   b. Place the ACU controller mounting plate on the studs with the flange toward the back of enclosure and optional battery bracket in the lower right-hand corner.
   c. Place the split lock washers and hex nuts on the studs and tighten securely.

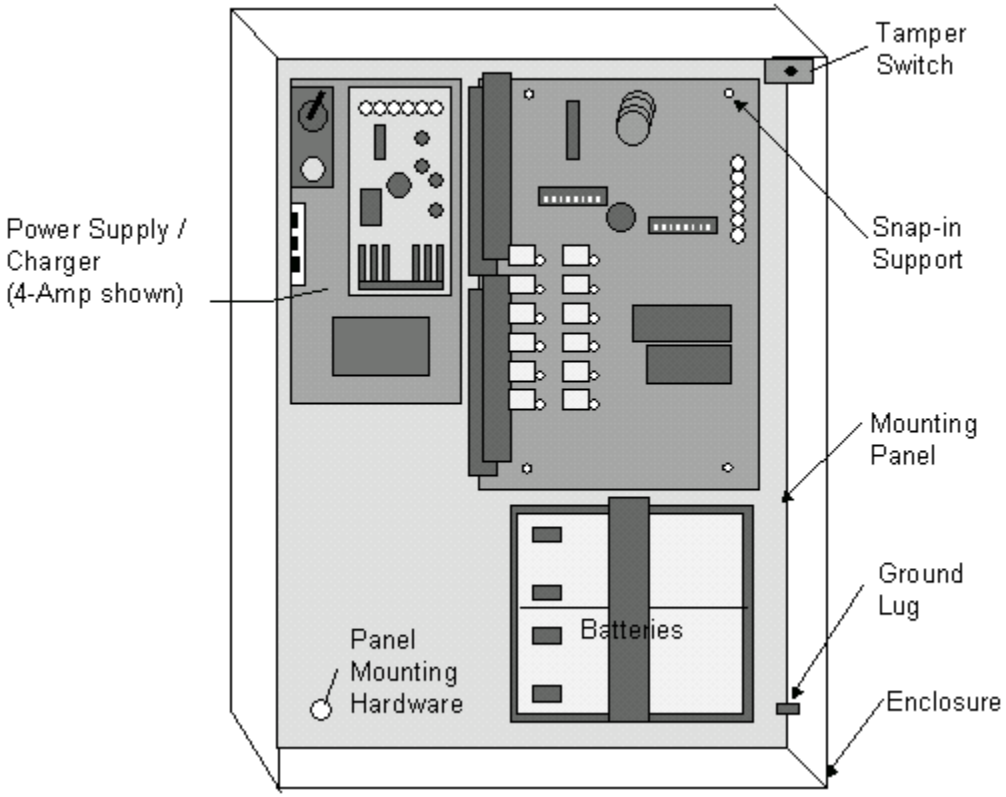
      It is recommended that all power wire cables be pulled into the panel at this point of installation in order to prevent any damage to the PCB assembly.

NOTE: If this is a CE installation, a large ferrite core (included) must be used on the Input Line. Loop the incoming AC line and clamp a large ferrite core so that the line passes through the core twice.

   d. Install the 6 furnished nylon snap-in printed circuit board supports in the 6 mounting holes in the top right of the mounting plate (3 on each side).

      The holes in the plate should match the holes in each end of the ACU controller's PCB Assembly. The snap-in supports are installed by inserting the two-prong, barbed end into the hole in the plate and pressing down until the support snaps into place and locks.

   e. Position the ACU controller's PCB Assembly (Figure 2-1) on the supports with a support in each hole in the end of the assembly.
   f. Press on the ACU controller's PCB Assembly at each support until the PCB assembly firmly rests in place on the support.
   g. Install the power supply assembly in the upper left-hand corner of the enclosure using the furnished hardware. The power supply is installed using the tapped holes in the enclosure.



(4 Amp power supply with optional battery backup shown)

Figure 2-1: Components mounted inside the ACU controller Enclosure

Mounting The Remote Module Enclosures

Remote modules, including the Remote Reader Electronics (RRE), Remote Input Module (SMT RIM) and Remote Relay Module (SMT RRM) are mounted inside a Remote Module Enclosure (ACU-ENCRM).

CAUTION:

The printed circuit boards or modules contain static-susceptible devices. Prior to handling them, be sure to follow the two rules below to avoid damaging these devices by static electricity.

Handle all static-sensitive components at a static-safeguarded work area.

Transport all static-sensitive components in static-shield containers or packages.

1. Open the enclosure door.
2. Pull (gently) the circuit board assembly from each of the four snap-in standoffs.
3. Loosen and remove the mounting hardware (4 places) securing the mounting plate to the enclosure. Save the hardware.
4. Determine the desired position and punch/drill an opening in the enclosure for the required wiring installation.
5. Position the enclosure onto the applicable mounting surface. Mounting holes (4 provided) on the enclosure are used as a template to mark the installation position.
6. Position and secure the enclosure (with user-supplied hardware) to the mounting surface.
7. Position the mounting plate (and the attached circuit board assembly) into the enclosure. Secure the

mounting plate with the mounting hardware removed in step 3.

8. Position the circuit board on the snap-in standoffs with a stand-off in each hole on the circuit board.
9. Press the circuit board at each standoff until the circuit board firmly rests in place on the standoff.

Preparing The Site For One-Stage Reader

Before it can be installed, the installer must first determine the exact location for the One State Reader (IGR-RPX2WB - Beige or G - Gray). A hole must be cut into the wall for mounting the One-Stage Reader.

Cutting the Wall

Each One-Stage Reader requires a hole cut for the 2-gang switch box. For new installations, one side of each hole for the box should be against a wall stud in order to secure the box to the stud. For retrofit installations, use a double 52-0W tiger-grip box. Establish the location of each unit requiring a hole cut for installing the unit.

NOTE: The installer should ensure that the holes to be cut DO NOT exceed the dimensions of the bezel.

Cut a hole for the size of each 2-gang switch box to be installed.

Installing the 2-Gang Switch Box on New Installations

The following procedure is used to install the 2-gang switch box for the One-Stage Reader:

1. Remove the knockouts from the 2-gang switch box as required.
2. Install the 2-gang switch box in the precut opening in the wall.
3. Attach the appropriate conduits to the 2-gang switch box.
4. Securing The Mounting Plate On The 2-Gang Switch Box
5. Remove the One-Stage Reader from the mounting plate.
6. Place the One-Stage Reader mounting plate onto the 2-gang switch box with mounting screws in a horizontal plane and secure the mounting plate with the four mounting screws.

Installing the One-Stage Reader on the Mounting Plate

This procedure must be done after all other installation procedures for the One-Stage Reader have been completed.

Route Wires from door monitor switch, electric door locking hardware and exit request device to J-box for card reader.

1. Make certain that all cables and wires for the One-Stage Reader are in place and connected.
2. Position and secure the One-Stage Reader onto the mounting Plate.

Running The Wire And Cables

Note the following when running the cables and wires:

- In running cables and wires, be sure to observe and follow applicable codes.
- The dry relay contacts are rated at 2 amp at 24 DC volts.
- All wires should be stranded.
- The maximum length of the wiring between the farthest Remote Module (One-Stage Reader, RRE, SMT RIM, or SMT RRM) and the ACU controller is 4000 ft. (1220 m) provided the remote module is locally powered.
- Guard against lightning damage.
- All bare Shields should be taped or protected against accidental shorting against electronic components.

Recommended Wire and Cable

The following are suggestions as to which cables to be installed for the specified use.

RS-485 from ACU to field panels:

(RS-485 cable)

Belden #9842 or Alpha #6222C, 24 AWG, 2-pair, braid overall shield, max distance 4000 feet

Or

(RS-422 cable)

Belden #1419A or Alpha #6202C, 24 AWG, 2-pair, foil overall shield, max distance 4000 feet

27.5 VDC from ACU to field panels:

Belden #9409 (1 pair) or Alpha #1897C, 18 AWG, 2-conductor/unshielded, max distance 4000 feet at 0.5 Amps.

Door contact input and exit request button/sensor:

Alpha #1172C, 22 AWG, 2-conductor/unshielded, max distance 1000 feet

Door lock control:

Belden #9409 (1 pair) or Alpha #1897C, 18 AWG, 2-conductor/unshielded, max distance 1000 feet

RMS-10 Reader:

Belden #9514 (4 pairs) or Alpha #1298C, 22 AWG, 8-conductor, over-all foil shield, max distance 10 feet.

K10 Keypad:

Belden #3006A (8 pairs) or Alpha #1299/15C, 22 AWG, 16-conductor (13 required), over-all foil shield, max distance 10 feet.

RMS-11 Reader:

Belden #9514 (4 pairs) or Alpha #1298C, 22 AWG, 8-conductor, over-all foil shield, max distance 10 feet.

And

Belden #3006A (8 pairs) or Alpha #1299/15C, 22 AWG, 16-conductor (13 required), over-all foil shield, max distance 10 feet.

K-11 Keypad or RMS-11 EXTD Reader:

Belden #9514 (4 pairs) or Alpha #1298C, 22 AWG, 8-conductor, over-all foil shield, max distance 500 feet.

IKE, RMS, RWE and RPX readers:

RS-485 from ACU:

(RS-485 cable)

Belden #9842 or Alpha #6222C, 24 AWG, 2-pair, individual shields, braid overall shield, max distance 4000 feet

Or

(RS-422 cable)

Belden #1419A or Alpha #6202C, 24 AWG, 2-pair, individual shields, foil overall shield, max distance 4000 feet

27.5 VDC from ACU to field panels:

Belden #9409 (1 pair) or Alpha #1897C, 18 AWG, 2-conductor/unshielded, max distance 4000 feet

NOTE: See Table A-13 for part numbers for all devices.

Other OEM Read Heads:

Minimum: LEDs and buzzer ***not*** controlled from RRE.

Belden # 9512 (2 pairs) or Alpha #1294C, 22 AWG, 4-conductor, over-all foil shield, max distance 500 feet.

Maximum: Red LED, Green LED and buzzer controlled by RRE.

Belden # 9514 (4 pairs) or Alpha #1297C, 22 AWG, 7-conductor, over-all foil shield, max distance 500 feet.

NOTES:

1. If using paired wires, do not wire DO and D1 in the same wire pair.
2. On long cable runs or cable runs where a large amount of current is required, the voltage drop in the cable should be calculated.
3. 22 AWG = 17.5 Ω per 1000 feet, 18 AWG = 6.92 Ω per 1000 feet, 14 AWG = 2.73 Ω per 1000 feet, 12 AWG = 1.71 Ω per 1000 feet. (Voltage = current multiplied by the resistance). If the voltage drop is greater than 5 volts larger gauge wire must be used.
4. Belden does not offer non-twisted pair cables.

RS-485 Information

RS-485 is a differential voltage communication circuit. The Impedance is 120 ohms. End-of-line terminators are required on both ends of the communications path. Multi-drop configurations are allowed with a maximum length of 4,000 feet. ***Stubs can be dropped, off the RS-485 cable, but the length of any stub cannot be longer than 10 feet.*** Stubs can connect to ACU controllers or remote modules such as a One-Stage reader, RIM, or RRM. Stubs must not be terminated. **GE Security strongly recommends star configurations be avoided.** (See Figure 2-2)

The ACU controller is switch selectable for RS-485 termination on each host and reader port.

The SMT RIM and SMT RRM Remote Modules have built-in terminators. The farthest unit from the ACU must be terminated.

All GE Security Host PC ports utilizing RS485 for communication will require an RS485 Converter (NCIC-5) and terminator. See page 3-4.

RS-485 Wiring with SMT RRM or SMT RIM as Last Device

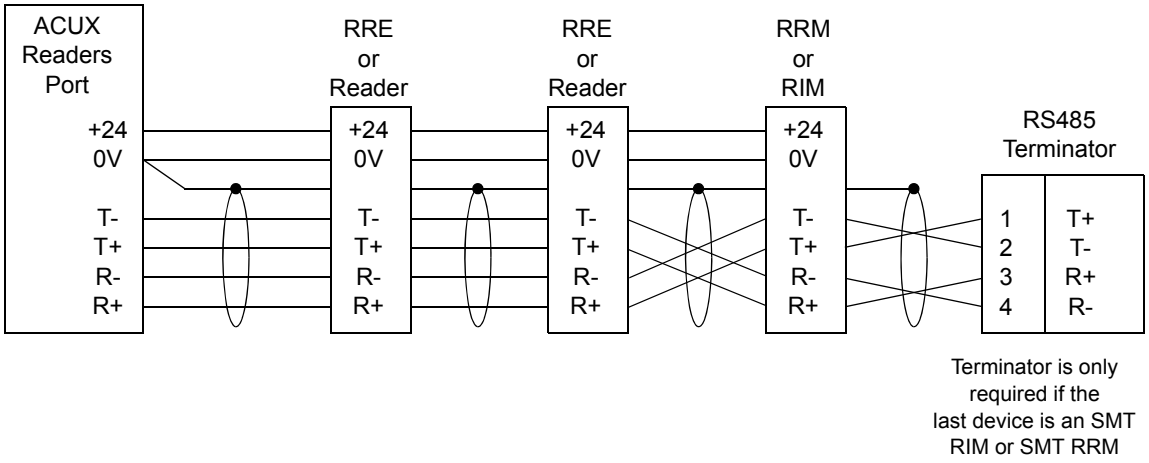


Figure 2-2: RS-485 Communication Wiring for SMT RRM and SMT RIM as last device

RS-485 Wiring with RRE as Last Device

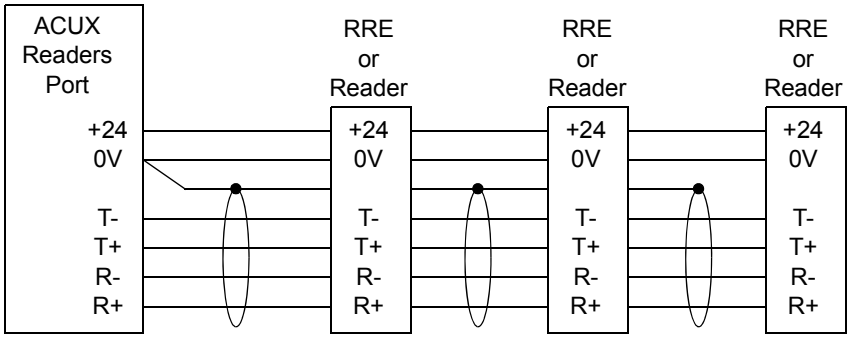


Figure 2-3: RS-485 Communication Wiring for RRE as last device

Pulling Wires and Cables

1. Pull in the wiring to the remote module from the ACU controller.

   All the wires except the strike pair may be run as one cable. The cable should have low-capacitance twisted pairs and a braided shield. Attach pigtail to shield and connect to chassis ground. The following Belden cable numbers (or equivalent) are suggested:

   Belden No. 9409-18 AWG for power, 1000 ft. (305 m) maximum distance

   Belden No. 9842-24 AWG for communication, 4000 ft. (1220 m) maximum distance

2. Pull in a single pair of wires from the enclosure to the electric door strike. The following Belden cable number (or equivalent) is suggested:

   Belden No. 9409-18 AWG

3. Pull in the wires from the enclosure from each alarm zone sensor, door contact and exit push button. The following Belden cable number (or equivalent) is suggested:

   Belden No. 9407-22 AWG

4. Pull in the wires from the enclosure from passive exit device (if required).

   The following Belden cable number (or equivalent) is suggested:

   Belden No. 9744-22 AWG

Auxiliary Power Supply for RRE-2, RIM, and RRM

In most cases the ACU can supply the power for the RREs, RIMs, and RRMs. When the ACU cannot supply power, an auxiliary power supply may be used. When using an auxiliary power supply make sure the 0V terminal on all Remote Modules is connected back to the auxiliary power supply and the 0V terminal on the ACU.

Alarm Zone Sensor Wiring

Pull in twisted pair of wire (Belden 9409-22 AWG or equivalent) from each alarm zone sensor to the assigned input terminals on the ACU Controller or Remote Module. (See Terminal Block Tables in each section for Alarm Zone terminations.) End-of-line (EOL) resistor for the SECURE state is 200 Ohms or 1,000 Ohms, DIP switch selectable (see DIP Switch setting on ACU). The End-Of-Line resistor must be located within the alarm zone sensor enclosure otherwise the alarm zone circuit will be considered unsupervised.

NOTE: On CE installations, unshielded I/O wires must pass through one small ferrite core. On the ACUXL16 there can be up to three groups containing as many wires in a group as needed. On the ACURS2/4,. there can be up to four groups containing as many wires in a group as needed. Clamp a single small ferrite core around a group of unshielded I/O wires as close as possible to the ACU housing.

When 1000 Ohms terminators are used, the sensors can be either normally closed contacts or normally open contacts providing the SECURE or inactive state is 1,000 ohms (See Figure 2-4). The ACU EOL terminator is part number 131727 (ACU-EOLAL). (Note: A normally open exit-push-button is wired the same as a normally closed alarm.) See Figure 2-5.

When 200 Ohms and 10000-Ohm terminators are used, wire resistance must be less than 30 Ohms. The loop requires a 200/10000 Ohm EOL resistor pair or use ACU EOL terminator part number 120649.

NOTE: A normally open exit push button is wired the same as a normally closed alarm. See Figure 2-6.

Zone Input State	Sensor Circuit in Ohms Normally Closed	Sensor Circuit in Ohms Normally Open
Secure	1000	1000
Active	2000	500
Open	> 50000	> 50000
Short	< 50	< 50

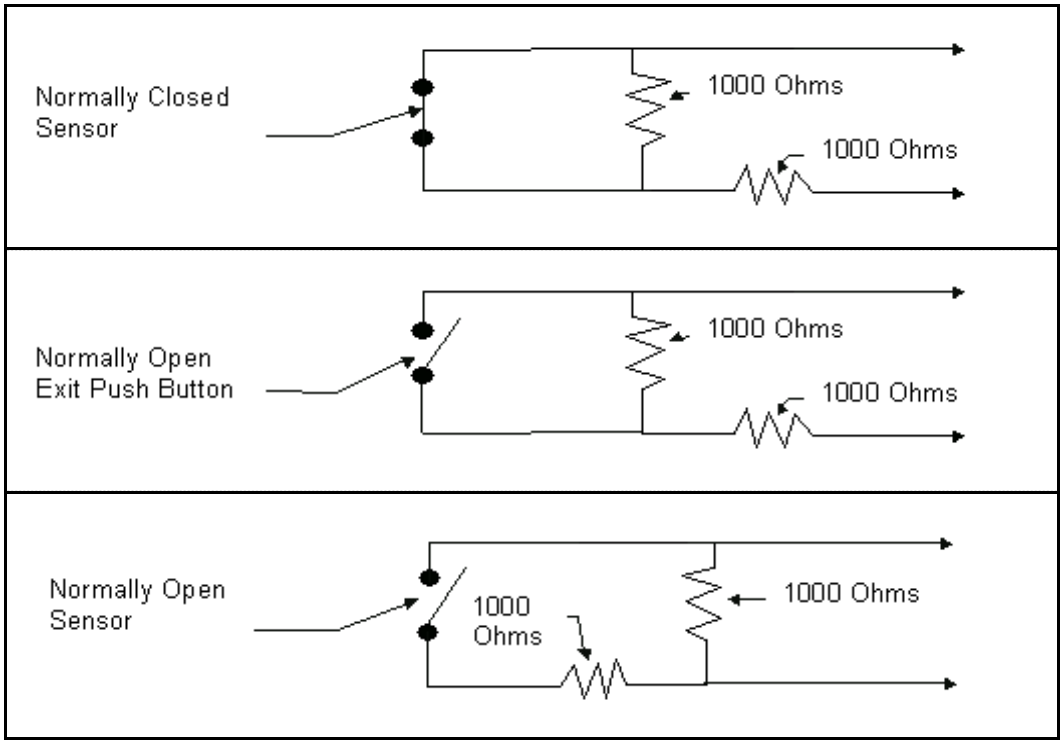


Figure 2-4: Zone Sensor with 1000-Ohm Resistors

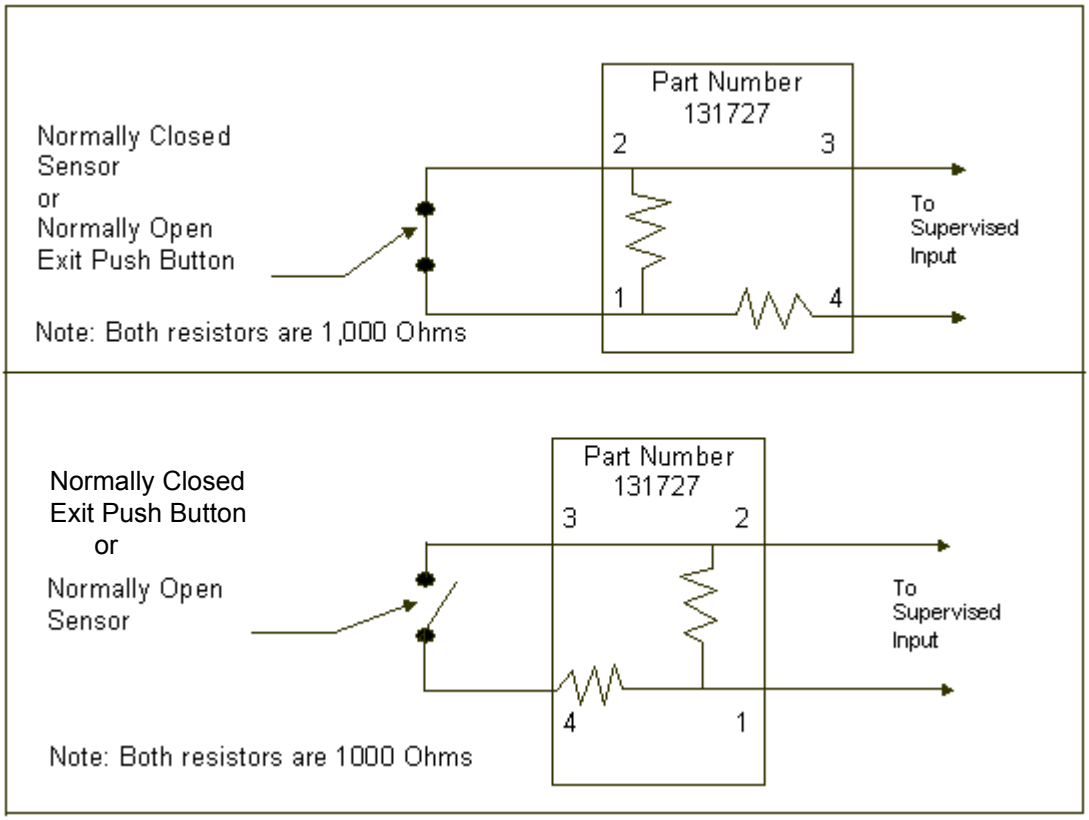


Figure 2-5: Zone Sensor Wiring with EOL terminator

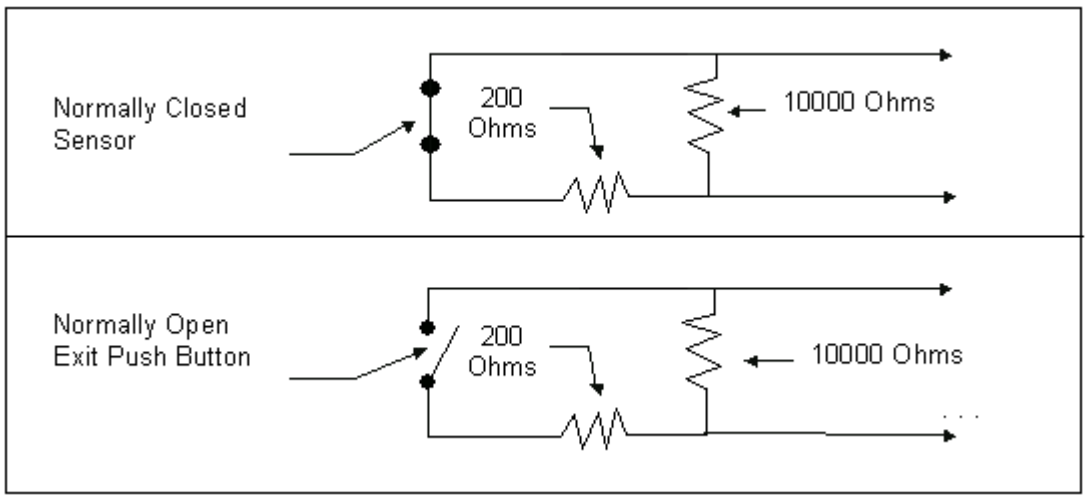


Figure 2-6: Zone Sensor Wiring with 200/10K Ohm resistors

Alarm Terminator Resistance and Voltage Details

ACU Alarm sense with 1k terminator:

Resistance	Zone State	Zone Voltage
0 - 50	Short	0v - .241v
60 - 370	Fault.	2.85v - 1.29v
380 - 620	Alarm	1.32v - 1.79v
630 - 780	Fault	1.80v - 2.04v
790 - 1.22k	Secure	2.05v - 2.5v
1.23k - 1.47k	Fault	2.51v - 2.69v
1.48k - 2.85k	Alarm	2.70v - 3.26v
2.86k - 40k	Fault	3.27v - 4.1v
30k - infinity	Open	

Table 2-1: ACU Alarm sense with 1k terminator

ACU Alarm sense at 200-ohm terminator:

Resistance	State
0 - 50	Short
60 - 150	Fault
160 - 250	Secure
260 - 4.4k	Fault
4.5k - 25k	Alarm
26k - infinity	Open

Table 2-2: ACU Alarm sense at 200-ohm terminator

RRE02-E00 Alarm sense – Surface Mount - 1K/1K ohm

Resistance	Zone State	Zone Voltage
0 - 50	Short	0 - .232
60 - 370	Fault	
380 - 600	Alarm	1.28 – 1.71
610 - 770	Fault	
780 - 1.20k	Secure	1.98 – 2.41
1.21k - 1.43k	Fault	
1.44k - 2.74k	Alarm	2.59 – 3.14
2.75k - 20k	Fault	
20k - infinity	Open	3.95 – 4.07

Table 2-3: RRE02-E00 Alarm sense – Surface Mount - 1K/1K ohm

SMT RIM Alarm sense - 1K/1K ohm

Resistance	Zone State
0 – 50	Short
60 – 370	Fault
380 – 600	Alarm
610 – 770	Fault
780 – 1.20k	Secure
1.21k - 1.43k	Fault
1.44k - 2.74k	Alarm
2.75k – 20k	Fault
20k – infinity	Open

SMT RIM Alarm sense – 200 / 10k ohm

Resistance	State
0 – 50	Short
60 – 150	Fault
160 – 250	Secure
260 - 4.4k	Fault
4.5k - 25k	Alarm
26k - infinity	Open

Table 2-4: SMT RIM Alarm sense - 1K/1K and 200 / 10K ohm

Door Strike Power Wiring

Figure 2-7 shows door strike power wiring for the ACU controller and RRE when power is supplied by the ACU controller. See the terminal block connection table for the relay terminals. Figure 2-8 shows door strike power wiring when power is supplied by the One-Stage Reader. Figure 2-9 shows door strike power wiring for the One-Stage Reader when power is supplied from external power source. **Always use a spike suppression diode installed at DC door strikes.** The diode in the Noise Suppressor, ACU-DSTNS, is a 1N4933. The dry relay contacts are rated at 2 amps at 30 DC volts maximum.

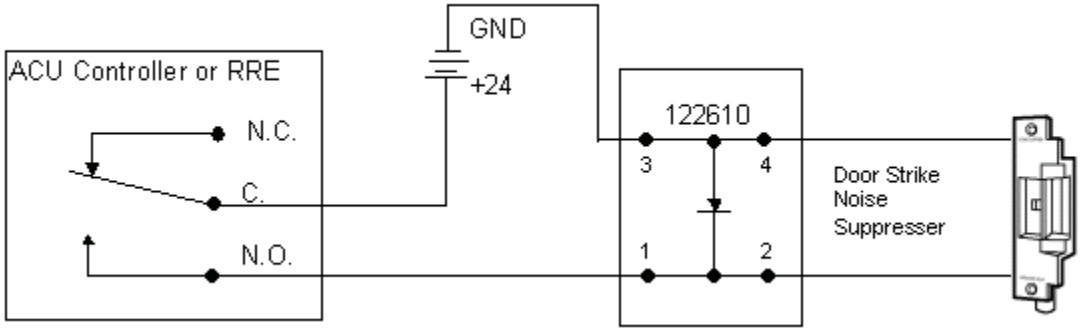


Figure 2-7: Door Strike Wiring for ACU, RRE and One-Stage

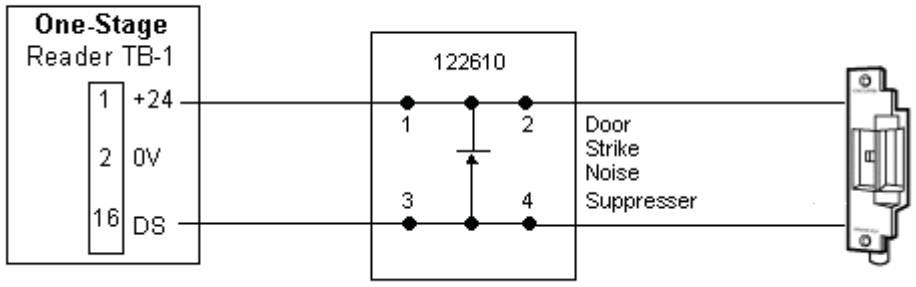


Figure 2-8: Door Strike Wiring for OLD One-Stage Reader

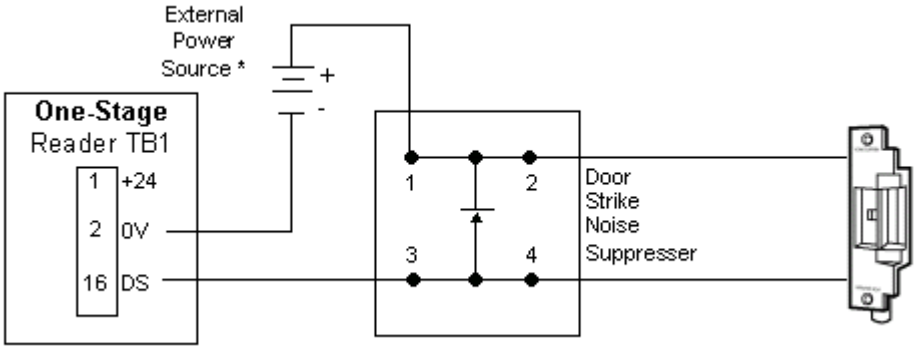


Figure 2-9: Door Strike Wiring for OLD One-Stage Reader (board #133277) with External Power

* For installations that require UL listing, the external power supply must be a UL listed, power limited power supply. See UL Specifications for additional information.

Wiring Power to The ACU Controllers

The Power Supply/Charger transforms 120 VAC (or 240 VAC) to 27.5 VDC to power the ACU controller and its remote modules, (reader, alarm and relay modules) See Power Supply information on pages 2-20 and 2-22. ACU Alarm Reporting Voltage Levels for AC fail is 24 VDC for low battery is 21 VDC. It also provides charging power for the UPS Batteries installed in the same enclosure.

Warning:

Make certain that the AC power source circuit breaker(s) is OFF before proceeding. An electrical disconnect device must be included as part of the building. Failure to heed this WARNING can cause death, personal injury or damage to unit(s).

NOTE: Connect the AC power circuit according to local electrical codes **after** all other wiring is connected.

CAUTION:

Power wiring must be dressed so that it does not come in contact with the ACU controller printer circuit board or any low voltage wiring. Conduit should be mounted to the enclosure on the left side.

1. Disconnect the AC power circuit ***until after*** all other wiring is connected.
2. When two or more ACU controllers are connected to the 120 VAC power source, splice the wires with wire nuts. **DO NOT** attempt to connect two (or more) wires to the same terminal.
3. Use 12 AWG maximum wire size. Factory recommends the use of stranded wire, (color-coded black, white, and green for 120 VAC, and color-coded black, red, and green for 240 VAC).

   If 12 AWG wire is used, the three solderless lugs supplied with the power supply assembly must be used to connect AC power to the power supply terminal strip (3M part number 123-6S-P). The crimping tool required to install these lugs is 3M crimping tool TH-440, TH-450 or Panduit crimping tool number CT-100, CT-160, CT-200, CT260 or equivalent.
4. Remove the clip-on cover barrier lock from the terminal TB1 (Line/Neutral/GND input) on the Power Supply/Charger Assembly.
5. Pull in and connect the three wires for the AC power source. Typical wire colors listed below.

120 VAC	Line = Black	Neutral = White	Ground = Green
240 VAC	Line = Black	Neutral = Red	Ground = Green
CE 240 VAC	Line = Brown	Neutral = Blue	Ground = Green/Yellow

6. Replace the cover.
7. The power supply maybe factory wired to the ACU controller. Refer to the figures on the following as an aid to connect AC power to the ACU controller.

NOTES:

- The 120 VAC or 220 VAC high voltage power wires shall be routed and fixed inside to prevent contact with accessible conductive parts.
- Low Voltage wires shall not be installed in the same conduit with the high voltage wires.
- AC power to the ACU panel must be supplied via a circuit breaker and through a 2-pole disconnect device. This disconnect device must be clearly identified and incorporate a lockout device.

ACU-5APWR Power Supply/Charger Assembly

The basic power supply used for the ACURS panel is the 5 Amp supply with an attached Altronix Power Distribution Module used to provide power to the door strikes. The basic 5 amp power supply is shown below. The Power Distribution Module is shown in Figure 2-11

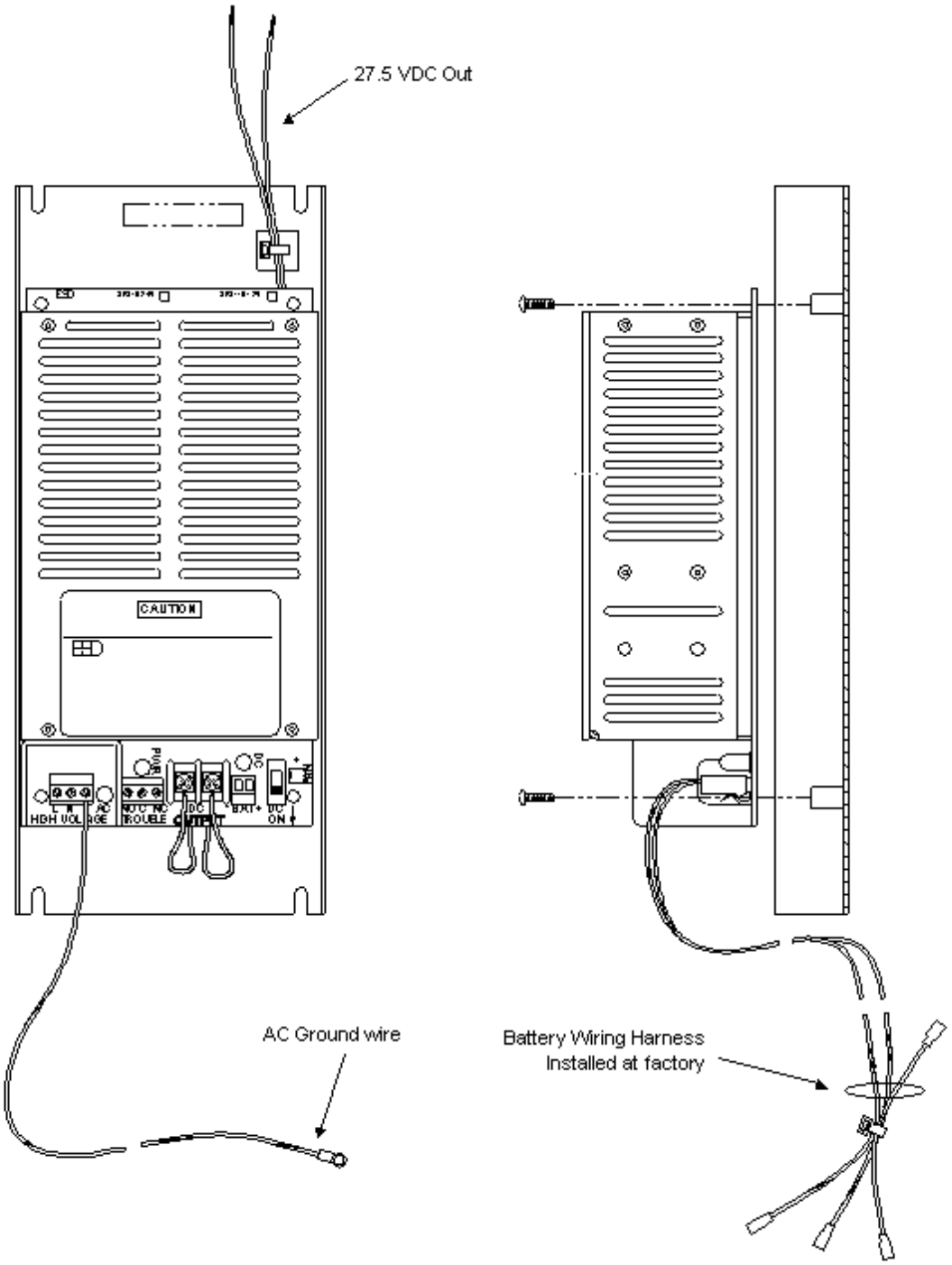


Figure 2-10: ACU-5APWR Power Supply/Charger Assembly

NOTE: The ACU-5APWR power supply can also be used in either the ACU2, ACU2X, ACUR2/4 without the power distribution module. The ACU2/16 requires the 8-Amp power supply.

Altronix PD4ULCB Power Distribution Module

This power distribution module is required on the ACURS2 and ACURS4 models. It comes from the factory mounted on top of the has either 12VDC or 24VDC up to 10 Amps. It has 8 outputs which are individually fused and have a maximum output of 2.5 amps each. The fuses are rated at 3.5 Amps, 250 Volts

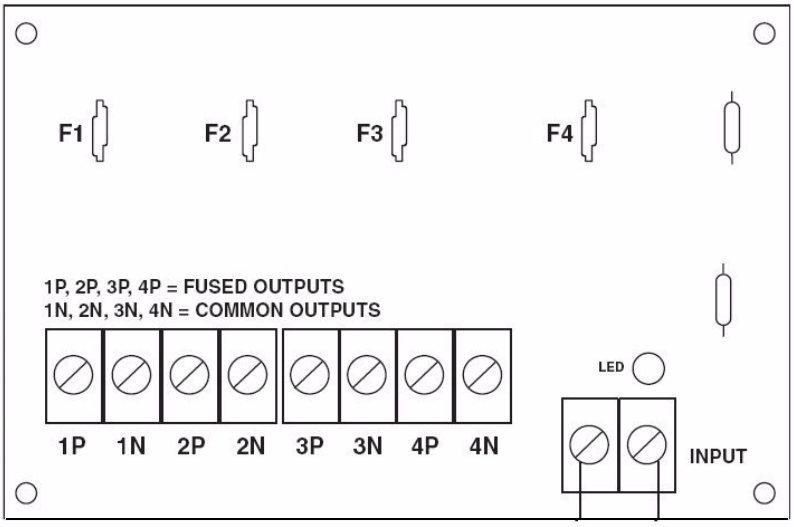


Figure 2-11: Altronix PD4ULCB Power Distribution Module

Connect the auxiliary devices such as Door Contacts to the PD4ULCB board using the terminal pairs as shown above. For Example, wire the first device to the terminals 1P and 1N; wire the second device to terminals 2P and 2N, etc.

NOTE: Measure the output voltage before connecting device. This will avoid any potential damage.

All of the terminals marked with the suffix P are positive. The terminals with the suffix N are negative.

Wiring Power to The ACU-5APWR Power Supply/Charger

The ACU-5APWR is a clean, efficient, heavy duty, low frequency off line switching power supply/charger. The ACU-5APWR uses a very low switching frequency of 23KHz, just above our hearing range. This, coupled with extensive filtering, provides a balance of super clean power and efficiency. This low frequency also eliminates interference problems with card readers.

The ACU-5APWR becomes an uninterruptible power supply when stand by batteries are connected with the wiring harness. It has a special power limiting circuit that allows the batteries to be charged across the output without lock up or chirping on and off. The batteries are protected with an automatic resetting circuit breaker and diode for over current and accidental reversed battery hookup. Float charging means faster recovery time for the batteries. There is no switch over or voltage drop when power fails. Standby batteries can be any capacity above 4 amp hours. The precise output voltage provides longer battery life. Reserve 1 Amp of your output power for charging the batteries.

Power Supervision includes a battery cut off relay and a separate power trouble alarm relay. The batteries cut off relay removes the batteries from the load when the batteries reach their service limit. This prevents the battery from going into deep discharge. A typical Gel Cell battery left in deep discharge for more than a couple of days will usually have to be replaced. The power trouble alarm relay output, form C contacts, can be used to signal a buzzer and/or other signaling device. The relay is normally energized for fail-safe operation. The relay has a green LED that is on when power is good. The relay will drop off of normal when the standby batteries reach about 70% of their capacity. This low voltage indication represents low battery and/or AC power failure. High voltage failure will also indicate power trouble.

Service Switch is provided to disable the power output. When the switch is turned off, the power supply is electronically disabled and the battery cut off relay is de-energized to remove batteries form the output terminal.

Explanation of Terminal and LEDs

The ACU-5APWR Supervised Power Supply/Chargers with standby battery(s) provide an uninterruptible 24 VDC power source.

AC Input Terminals are marked High Voltage (L)ine, (N)eutral, and (G)round. The terminal block and AC LED are mounted within a high voltage barrier. T3he terminal block is self-clamping and can accept wires from 12awg to 18awg. The Green LED adjacent to terminals is ON when AC is applied.

NOTE: AC Fuse Link is inside unit for catastrophic failure. This fuse is not field replaceable, unit must be returned to factory for service should this fuse blow. A blown fuse is indicated by the AC LED off with AC power applied.

Power Trouble Terminals are marked NO-Normally Open, C-Common, and NC-Normally Closed. The normal relay position indicates the output power is in the normal range and the relay is energized. The terminal block is self-clamping and can accept wire form 14awg to 24awg. The contacts are rated for up to 2A resistive load to 120 volts. The Green LED adjacent to the terminal block is ON when power is in the normal range. When the AC fails and the battery(s) drop to about 70% capacity, the power trouble relay and LED will go off normal. If an internal failure caused the output to rise above normal, this would also cause the power trouble relay and LED to go off normal.

DC Output Terminals on the ACU-5APWR is marked -DC+ output. The ACU-5APWR has a DC output of 24VDC with 4 Amps of continuous current, reserving 1 Amp for battery charging. The terminal block is self-clamping and can except wires from 10awg to 24awg. The Red LED adjacent to terminal block is ON when output voltage is present.

Battery Connector is marked -Bat+. This is a .156” 2 position header with lock. The provided battery cable plugs in to this. Output is short circuit protected with electronic power limiting (Not Class II) and a self-resetting circuit breaker in series with battery.

ACU-5APWR Power Supply and Charger Specifications

AC Input	100-240VAC / 47-63Hz/220 Watts Max
DC Output Range	18.5-28.0 VDC, 24 VDC nominal, 4A (Typical Output is 27.5 VDC)
Typical Output Ripple & Noise	30mv
Current Overload Short Circuit Protection	Yes
Service Switch Disables DC power and battery from Output	Yes - (Service switch has been removed on European models with CE mark)
Battery PTC Circuit Breaker	6A
Over Temperature protection	Yes
Ambient Operating Temperature Range	0°C to 70°C
Switching Frequency	23KHz
Battery Cutoff Voltage	19.8 VDC
Battery Cutoff Relay Contacts	20A Resistive
Power Trouble Trip Points	<21.3 VDC or >28.2 VDC
Trouble Relay Form C Contacts	2A up to 120 VAC
Weight	2.7 lbs.
Size	10”H x 4.25”W x 3”D

Table 2-5: General Specifications ACU-5APWR Power Supply and Charger

Maintenance

The Power supply and stand by battery(s) should be tested at least once a year as follows:

1. Check LED’s for normal state. AC ON Green, Trouble ON Green, DC ON Red
2. Check output voltage with normal load, should read between 27.00 and 27.8 VDC. This assures proper voltage to float charge batteries.
3. Disconnect AC input. AC LED should be off, all other LED’s should remain normal.
4. Check DC Output to be above 24.2 VDC. This checks standby batteries to be operational. Sealed lead acid batteries have a typical life of 3 to 5 years.
5. Re-apply AC and verify AC LED ON.

Wiring Power to The 8-AMP Power Supply/Charger

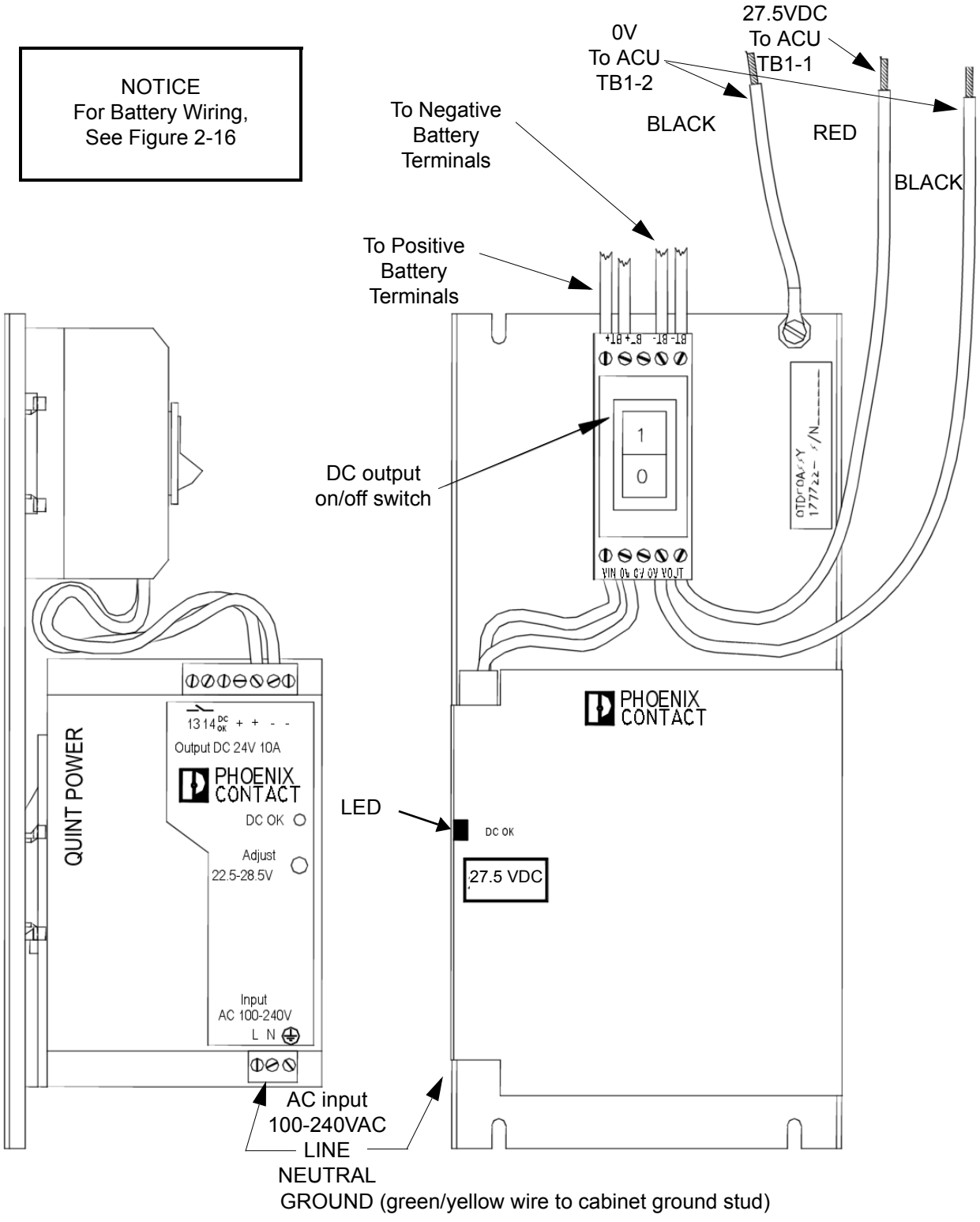


Figure 2-12: 8-Amp ACU-8APWR Power Supply/Charger Assembly

ACU-8APWR Power Supply and Charger Specifications

AC Input	85-264VAC / 57-65Hz/300 Watts Max
DC Output	27.5 VDC, 6A Max Plus 2Amps for battery charging
Typical Output Ripple & Noise	100 mV pp
Current Overload Short Circuit Protection	Yes
Service Switch Disables DC power and battery from Output	Yes
Battery PTC Circuit Breaker	8 A
Over Temperature protection	Yes
Ambient Operating Temperature Range	-25°C to 70°C
Power Trouble Trip Points	24.75 VDC
Trouble Relay NC Contacts	1A 30 VAC
Weight	4.0 lbs
Size	10” H x 5” W x 4” D

Table 2-6: General Specifications ACU-8APWR Power Supply and Charger

NOTE: For battery backup UL294 or UL1076 operation with 14AH (4 each 12V 7Ah) batteries, the maximum load current is 2.4A.

120VAC and 240VAC Wiring for 8AMP Power Supply/Charger (ACU-8APWR)

The ACU power supply can be modified in the field for either 120VAC or 240VAC by simply moving a few wires on the transformer from one terminal to another. If you are making this modification make sure the transformer on the power supply is wired as shown in Figure 2-13 for 120VAC or Figure 2-14 for 240VAC. See Warnings below.

If you have any questions about preforming this modification DO NOT proceed without assistance from technical support.

Warning:

Make certain that the AC power source circuit breaker(s) is OFF and batteries are disconnected before proceeding. Failure to heed this WARNING can cause death, personal injury or damage to unit(s).

Warning:

Make certain that the AC power supply is wired correctly before reapplying the power to the panel. Failure to heed this WARNING can cause damage to unit(s).

Wiring 120VAC for 8AMP ACU-8APWR Power Supply/Charger

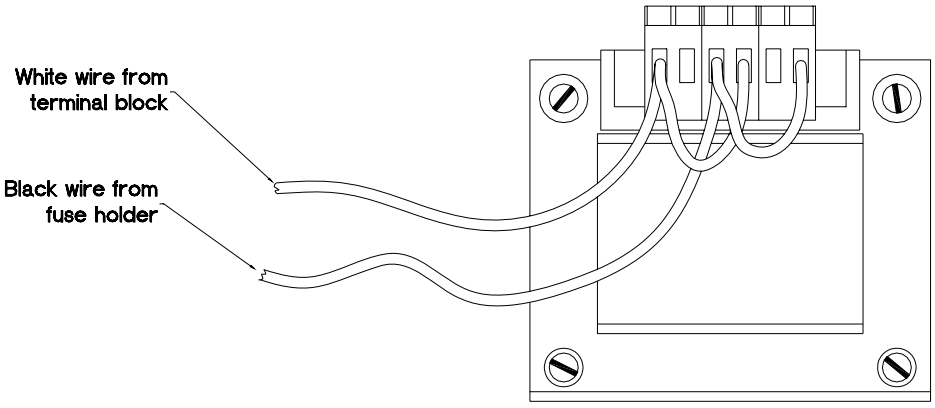


Figure 2-13: 120VAC Wiring for 8AMP Power Supply and Charger

Wiring 240VAC for 8AMP ACU-8APWR Power Supply/Charger

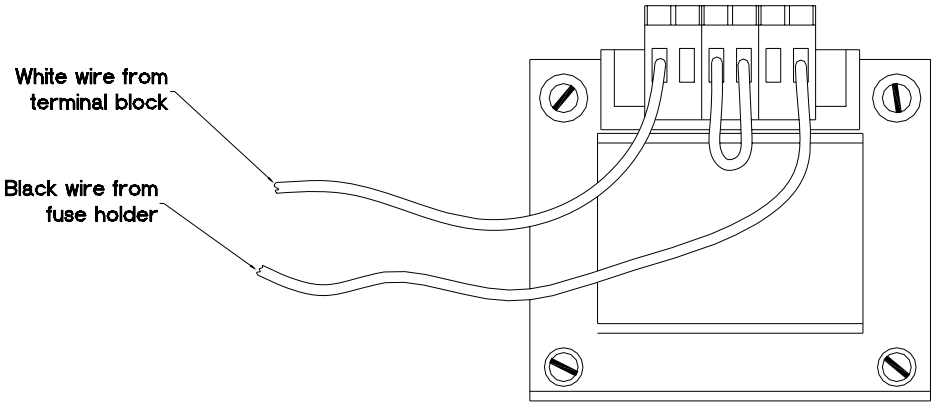


Figure 2-14: 240VAC Wiring for 8AMP ACU-8APWR Power Supply and Charger

Wiring Power to The 8-AMP Power Supply/Charger (Obsolete)

Connection Locations

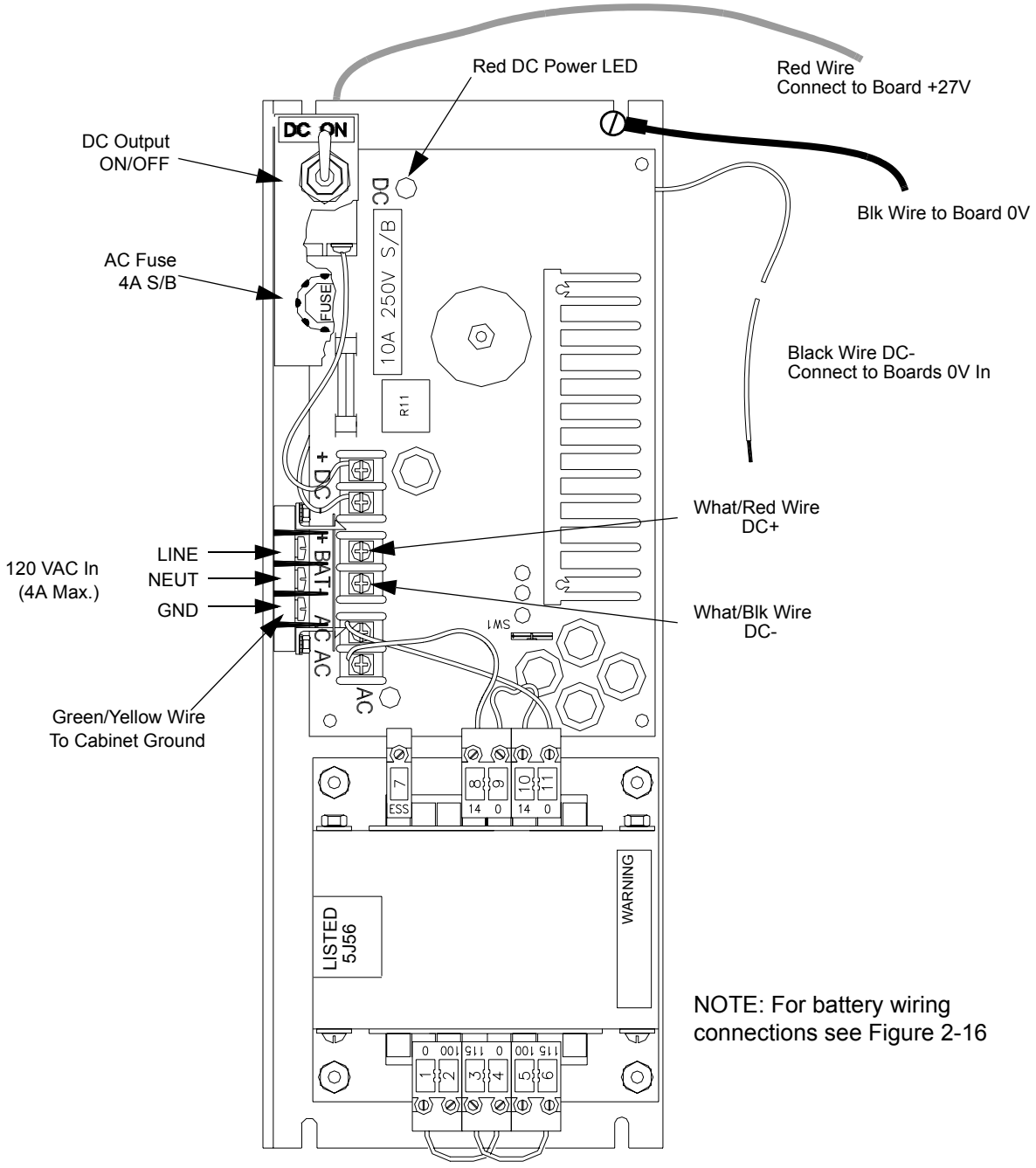


Figure 2-15: 8-Amp Power Supply/Charger Assembly

NOTE: The 8-Amp power supply can be used in either the ACU2 or with the ACU2/16 option.

8-AMP Power Supply/Charger Installed in Cabinet (Obsolete)

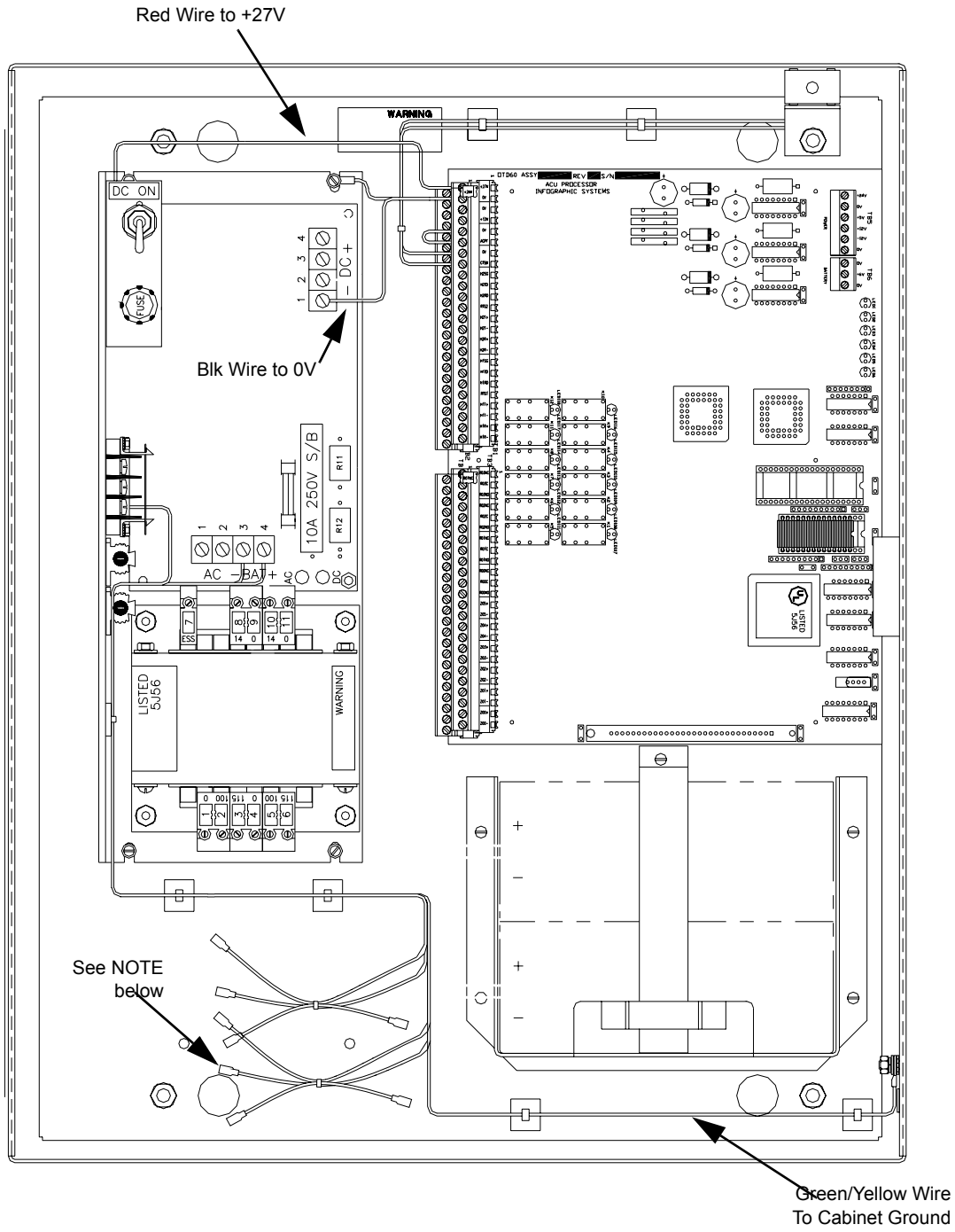
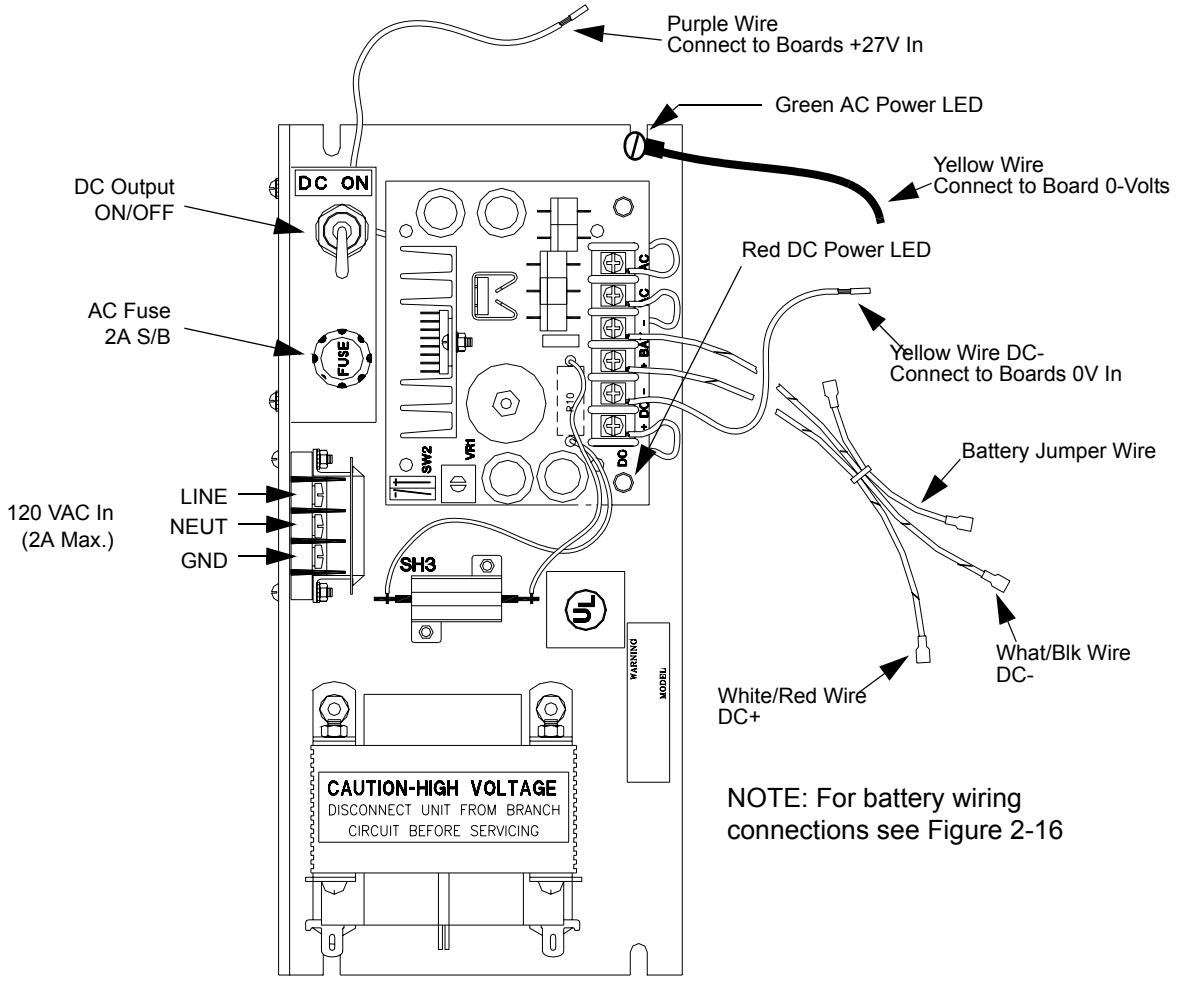


Figure 2-16: 8-AMP ACU2-PS8 Power Supply/Charger Installed in Cabinet

NOTE: The 8AMP power supply is normally supported by four 12 Volt 7Amp batteries. An additional set of battery wires is provided. The Black Stripe wires are Negative, Red Stripe are Positive.

Wiring Power to The 4-AMP Power Supply/Charger (Obsolete)

Connection Locations



Standard 4-amp power supply provides 3 amps for controller, reader modules and door hardware 1.0 amp for changing optional batteries (max. 15 Amp-hour) To comply with UL 1076, 2 Batteries are required. Extended 8-amp power supply provides 6.0 amps for controller, reader modules and door hardware 2.0 amps for charging optional batteries (max. 30 Amp-hour) To comply with UL 1076, 4 Batteries are required.

Typical Operation Current (in Amps)		
Controller Board	ACU	0.160 +0.013 per relay
One stage reader w/o display	RMS-1, RWE-1	0.065
One stage reader w/ display	RMS-2, RWE-2	0.115
One stage reader HP w/o display	RPX-1	0.050 +0.013 per relay
One stage reader HP w/ display	RPX-2	0.065 +0.013 per relay
Remote Reader Electronics	RRE 0.050 +0.013 per relay + read head	
Remote Input Module	SMT RIM	0.140 +0.013 per relay
Remote Relay Module	SMT RRM-1	0.040 +0.013 per relay

Figure 2-17: ACU 4-Amp 120 VAC Power Supply/Charger wiring diagram.

See UL Specifications Section for additional information. Although each reader port may draw a maximum of 2.5 Amps per port, to comply with UL 1076 and UL 294, the maximum current draw per port must be limited to 1.25 Amps. (TB2-1, 2 and TB2-7,8)

NOTE: The 4-Amp power supply should not be used in a controller with the ACU2/16 option.

ACU2-PS4 Power Supply/Charger Installed in Cabinet (Obsolete)

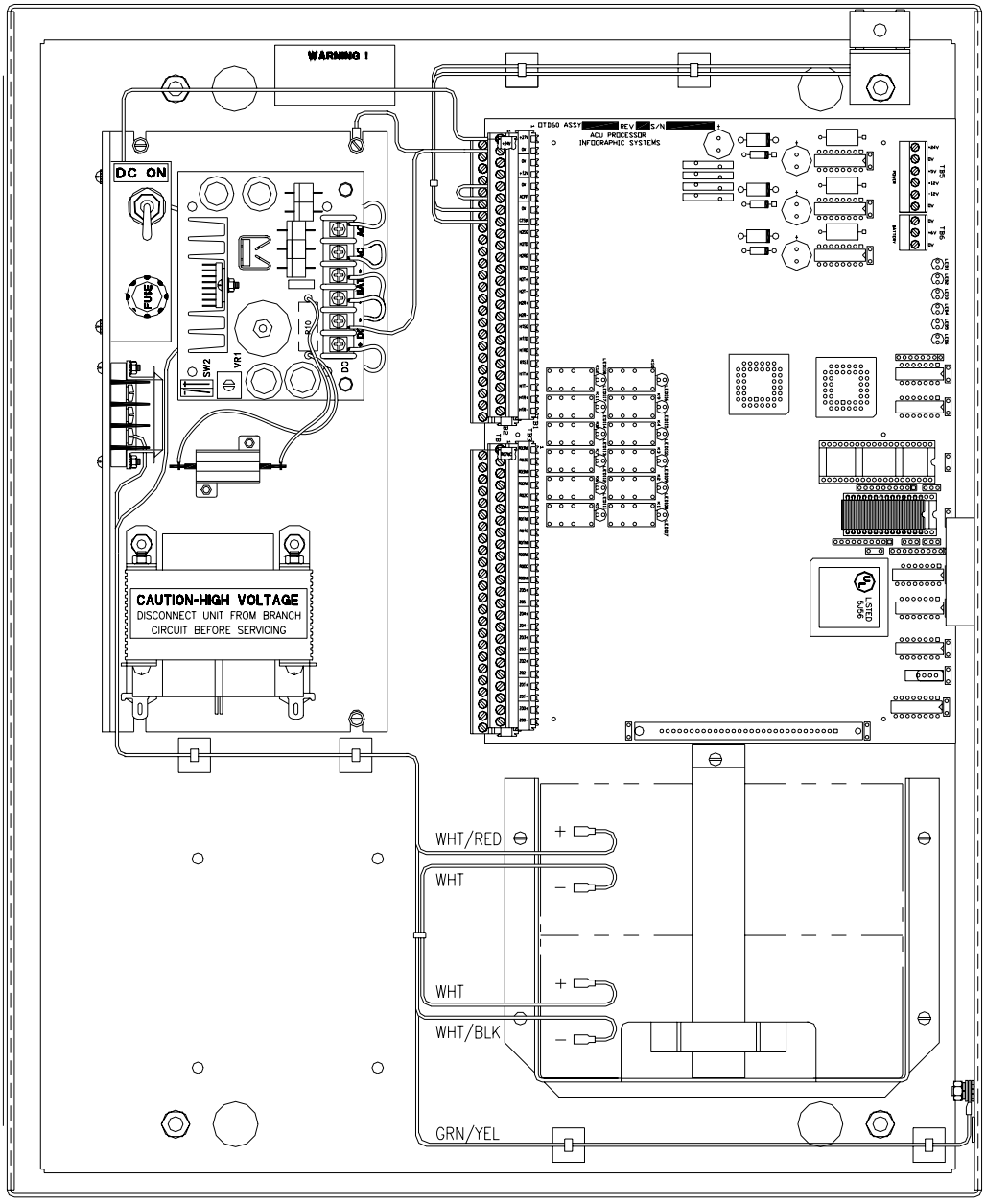


Figure 2-18: ACU2-PS4 Power Supply/Charger Installed in Cabinet

120VAC and 240VAC Wiring for 4AMP Power Supply/Charger

The ACU power supply can be modified in the field for either 120VAC or 240VAC by simply moving a few wires on the transformer from one terminal to another. If you are making this modification make sure the transformer on the power supply is wired as shown in Figure 2-19 for 120VAC or Figure 2-20 for 240VAC. See Warnings below.

If you have any questions about preforming this modification DO NOT proceed without assistance from technical support.

Warning:

Make certain that the AC power source circuit breaker(s) is OFF and batteries are disconnected before proceeding. Failure to heed this WARNING can cause death, personal injury or damage to unit(s).

Warning:

Make certain that the AC power supply is wired correctly before reapplying the power to the panel. Failure to heed this WARNING can cause damage to unit(s).

Wiring 120VAC for 4AMP Power Supply/Charger

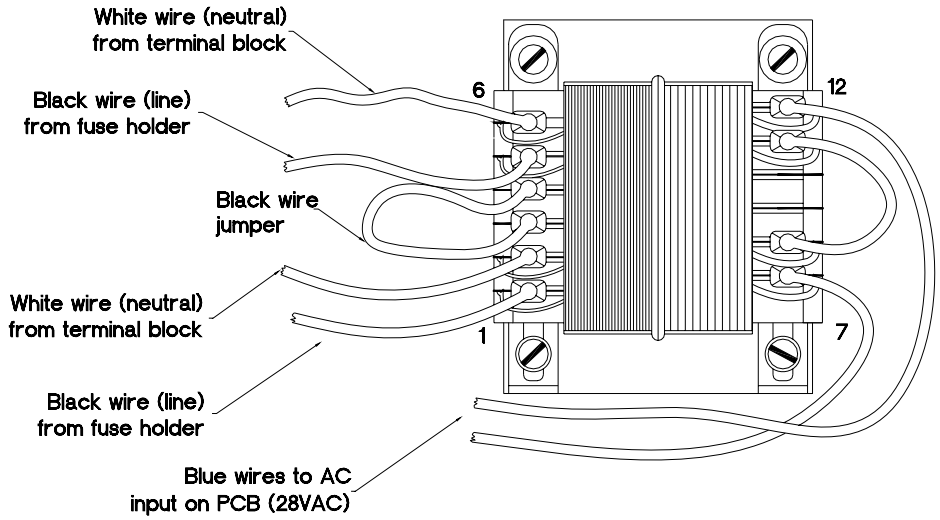


Figure 2-19: 120VAC Wiring for 4AMP Power Supply and Charger

Wiring 240VAC for 4 AMP Power Supply/Charger

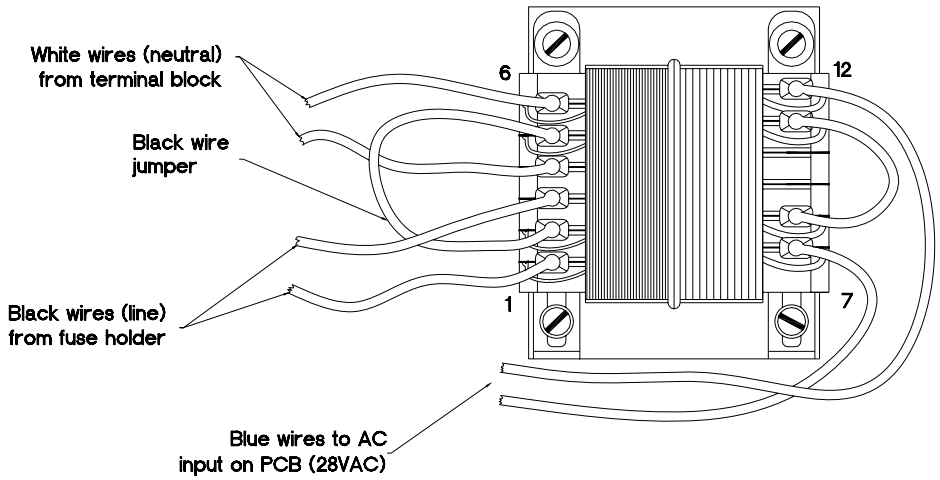


Figure 2-20: 240VAC Wiring for 4AMP Power Supply and Charger

REN Remote Enclosure

When large numbers of alarm inputs and/or relay outputs are required, Remote Input Module (SMT RIM) and Remote Relay Modules (SMT RRM) may be combined into a special enclosure, then provides numerous options for SMT RIM capacity, SMT RRM capacity, and power supply configuration.

The dimensions are the same as the ACU enclosure and also come in a version with a display window so the LEDs on the SMT RIM modules as visible from the out side of the enclosure.

Installing and Connecting the Optional Uninterruptible Power Supply (UPS) Batteries

Warning:

Be sure to observe battery manufacturer's instructions:

Danger Explosive Gases

- Can cause blindness or severe injury.
- Use in a well ventilated area away from open flame, cigarettes, sparks, and other sources of ignition.
- Shield eyes and face when working around battery.
- Do not make direct contact between the positive and negative terminals.
- Do not puncture, disassemble or incinerate batteries.
- Dispose of in accordance with environmental regulations.

Poison - contains lead compounds and corrosive acid

Contains sulfuric acid. Causes severe burns. In the event of contact flush with water and obtain immediate medical attention.

Keep out of reach of children

Re-Charge in accordance with manufacturer's instructions

Warning:

Make certain that the AC power source circuit breaker(s) is OFF before proceeding. Failure to heed this WARNING: can cause death, personal injury or damage to unit(s).

CAUTION:

To avoid an electrical short, do not let the contacts on the batteries touch any part of the enclosure or mounting plate.

The Uninterruptible Power supply (UPS) battery installation and wiring connection to the ACU Controller Power Supply/Charger Assembly is made as follows:

1. Install the battery bracket (supplied with the optional battery kit) using the four screws, split lock washers and flat washers.
2. Install the two 12 VDC rechargeable batteries on the battery shelf as shown in Figure 2-21.
3. Place the battery strap bracket over the batteries on the shelf. Secure the battery strap bracket with a screw, split washer and flat washer.
4. Connect the battery cables (AFTER all other wiring is connected) to the battery as shown in Figure 2-17.

ACU Alarm Reporting Voltage Levels for AC fail is 24 VDC for low battery is 21 VDC.

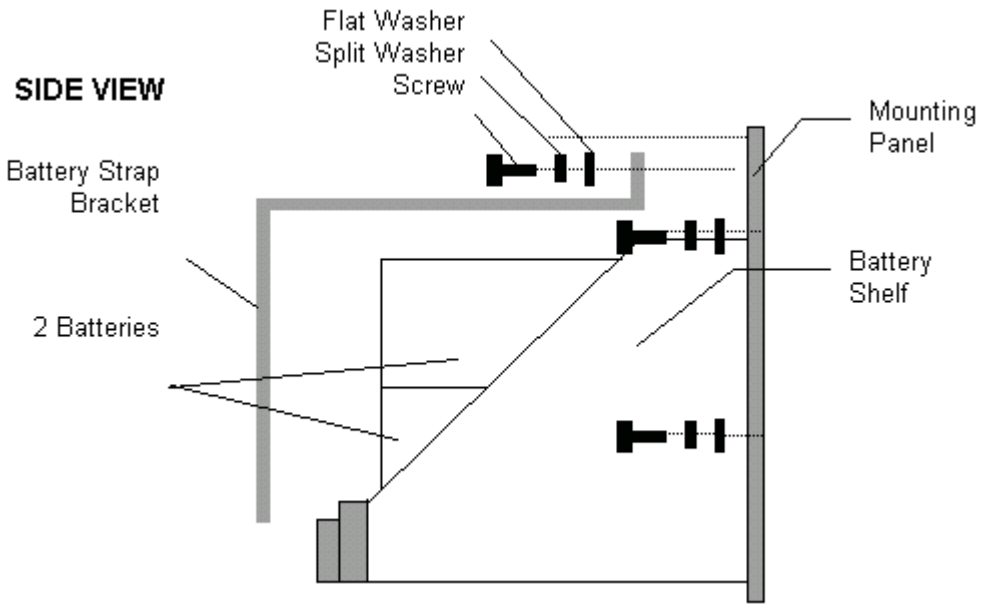


Figure 2-21: Optional Battery Shelf for ACU UPS Batteries

NOTE: See Table A-13 for information on the UPS Battery Model Numbers.

ACU Power & Battery Worksheet

Model #	Description	Quantity	Current	Extended
ACU2&ACU2/16	Networked Intelligent Controller		0.275	
ACU-R2	Networked Intelligent Controller w/ 2 Reader Interface		0.135	
ACU-R4	Networked Intelligent Controller w/ 4 Reader Interface		0.155	
RMS-1	Magnetic Stripe One Stage Reader		0.045	
RMS-2	Magnetic Stripe One Stage Reader w/ Display		0.055	
RWE-1	Wiegand Effect One Stage Reader		0.055	
RWE-2	Wiegand Effect One Stage Reader w/ Display		0.065	
RPX-1	Proximity One Stage Reader		0.065	
RPX-2	Proximity One Stage Reader w/ Display		0.075	
IKE-2	Integrated Keypad Electronics w/ Display		0.055	
IKE-10	Integrated Keypad Electronics		0.045	
RRE	Remote Reader Electronics – 1 read head (read head excluded)		0.050	
RRE02 & RRE04	Remote Reader Electronics – 2 & 4 read heads (read heads excluded)		0.160	
RIM	Remote Input Module		0.140	
RRM	Remote Relay Module		0.040	
NCEX-1	RS485 HUB (extender)		0.040	
NCEX-3	RS485 HUB (extender)		0.080	
NCEX-2	RS485 HUB (extender)		0.060	
RMSC-10	Mullion Smart Card Reader (5Vdc @ 0.10A)		0.050	
TOTAL OPERATING CURRENT DRAW				

This table assumes all devices (except for RMSC-10) are 24Vdc nominal and powered from ACU.

If the total operating current draw is less than 3.0 amps, use the standard 4-amp power supply (ACU2-PS4) that provides:

- 3.0 amps for operating the controller, reader modules and door hardware, 1.0 amp for charging the optional batteries (a maximum of 15 Amp-hour).

If the total operating current draw is greater than 3.0 amps and less than 6.0 amps, use the extended 8-amp power supply (ACU-8APWR) that provides:

- 6.0 amps for operating the controller, reader modules and door hardware, 2.0 amps for charging the optional batteries (a maximum of 30 Amp-hour).

Battery Backup Calculation:

- To determine battery capacity required to maintain full operations of ACU and devices powered by ACU (Note 3), use the formula below. Each pair of Gel-Cell Batteries (Part no. 133-319) is rated at 24Vdc, 7 Amp-hour (Note 4). The ACU enclosure can hold up to 4 batteries.

Total Operating Current Draw	X	Number of Hours of Operation Required	=	Amp-hour Capacity Requirement
Amps	X	Hours	=	Amp-hours

NOTES:

1. Supports all Two-stage Card Readers: Bar Code, Magnetic Stripe, Wiegand and Passive Proximity, etc.
2. Assumes none of the relays are energized. Add 0.013 amp for each energized relay.
3. Use of Fail Secure door hardware will decrease battery capacity requirements.
4. Amp-hour capacity is based on 20-hour discharge rate. Multiply amp-hour capacity by 0.75 for 4-hour rate.
5. Electric deadbolt or any other high surge devices should be separately powered.

Power wiring to the REN expansion power supply/charger (obsolete)

Unless otherwise specified, the REN power supply is configured for 120 VAC. Use Figure 2-19 and Figure 2-20 to configure the power supply for 240 VAC operations.

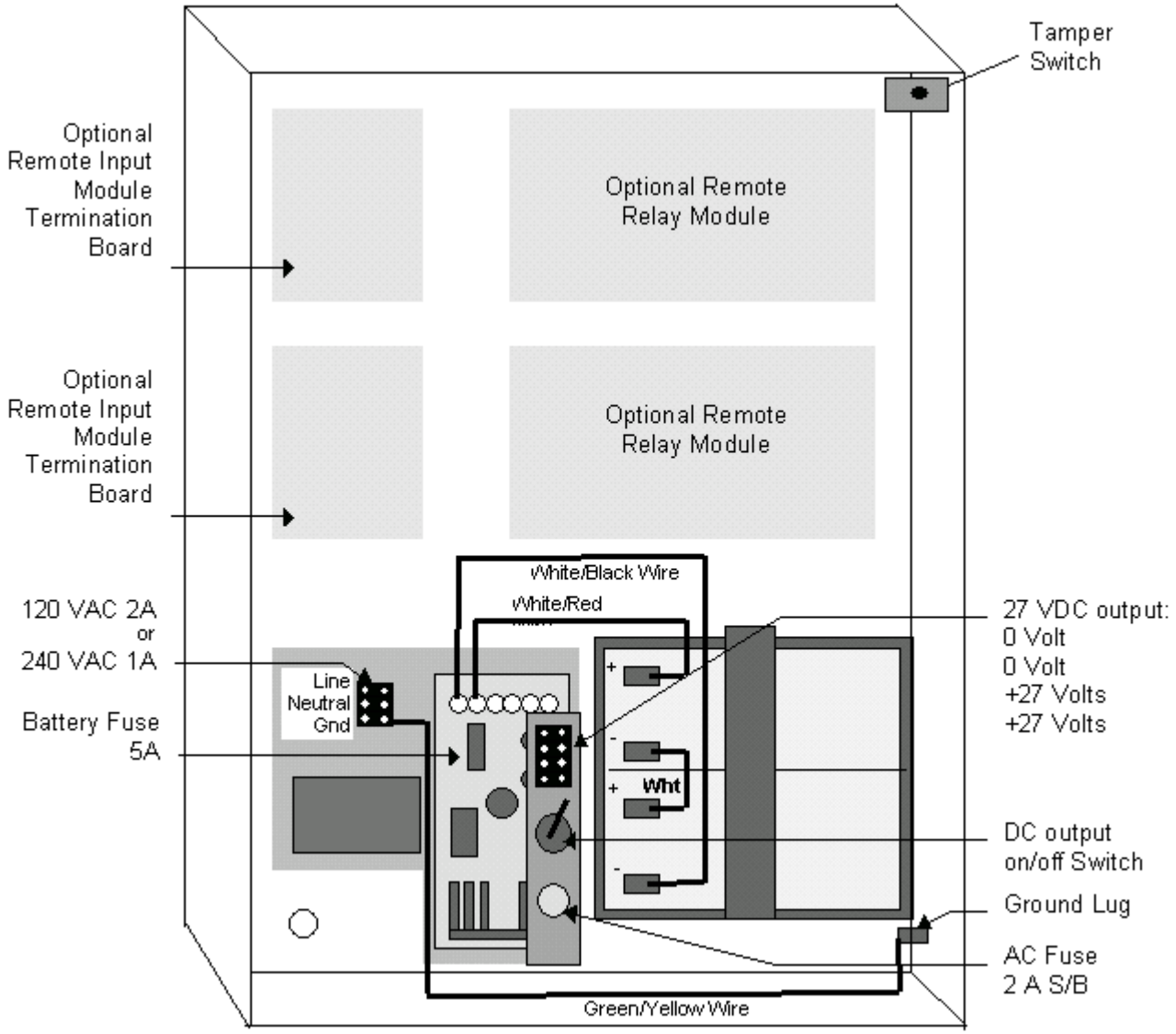


Figure 2-22: Components mounted inside the REN Enclosure

(ACU Expansion Power Supply with optional battery backup shown.)

Chapter 3

ACUXL16, ACURS2, and ACURS4

This section contains:

- Terminal Block Connectors
- Host Communication Wiring
- Jumper Configurations on the Controllers
- Configuring the DIP switch settings on the Controllers
- Controller Alarm Reporting
- Controller Relay Assignments
- LAN Configuration
- Dial-Up Modem Configuration

Overview

This section provides technical information on all models of ACU controllers. These intelligent networked devices provides access control, alarm monitoring and output control. The ACUXL16 model provides two host serial-ports for connections to a server computer using either RS-485 or RS-232 communications. The ACURS2 and the ACURS4 have one RS232/RS485 host port and one LAN port. The ACUR-2 and R4 and the ACU2 and ACU2X are no longer available. Information regarding these products is available at the end of this chapter.

Reader communication is non-encrypted polled serial protocol up to 4000-ft. (1220 m) for One-Stage Readers and Remote Electronics Modules, such as readers, inputs or outputs.

ACUs provide Twelve (12) Grade-AA supervised inputs, Eight (8) Grade-AA supervised inputs on the ACU-R4 or four (4) Grade-AA supervised inputs on the ACU-R2 provide alarm monitoring. These supervised inputs are for alarm devices, exit push button, and door contacts for the card readers. Each model is also equipped with unsupervised cabinet tamper, AC power fail input and low battery.

Form-C relays are provided on each model for strike activation and/or remote control. All relay contacts are rated for 28 VDC at 2 amperes. DO NOT switch any voltages over 30 volts. There are 12 relays on the ACUXL, four on the ACURS2, and eight on the ACURS4.The ACUR2/4 have two position jumpers which determine contact usage on its four relays.

DIP switches set the device's communication baud rate and address. DIP switches are also used to terminate alarm inputs and host communications ports.

NOTE: See Table A-13 for specific Model Numbers.

Host Communications Wiring

Communication between the controller and input devices such as readers or alarm points and output devices such as relays is carried by either RS-232 or RS-485 interfaces.

RS-232 Interface to ACU Controller

RS-232 Interface is a simple interface between a host computer and Modem to a SINGLE ACU Controller. Maximum overall length of the wires from host computer to the ACU controller is 50 ft. (15 m).

Pull in a two pair shielded cable (four wires and shield) from the host processor serial communications port to the ACU controller. Table 3-1 through Table 3-3 shows the cable connections. Attach pigtail to shield and attach to chassis ground.

A Personal Computer's comm port 1 is typically 9-pin male connector.

DE-9	ACUXL Controller	ACURS Controller	Description
3	H1RD (TB1-19)	TXD (TB1-2)	Receive Data
2	H1TD (TB1-18)	RXD (TB1-3)	Transmit Data
5	H1SG (TB1-17)	SIG GND (TB1-1)	Signal Ground

Table 3-1: PC (9-pin) to ACU (RS-232)

A Personal Computer's comm port 2 is typically a DTE 25-pin male connector.

DB-25 DTE Pin numbers	ACUXL Controller pin number	ACURS Controller pin number	Description
2	H1RD (TB1-19)	TXD (TB1-2)	Transmit Data
3	H1TD (TB1-18)	RXD (TB1-3)	Receive Data
7	H1SG (TB1-17)	SIG GND (TB1-1)	Signal Ground

Table 3-2: PC (25-pin) to ACU (RS-232)Modem Connection:

Modem Connection:

Provide a two pair shielded cable (four wires and shield) from the modem's serial port to the ACU controller. Table Table 3-3 shows the cable connections. The shield attaches to chassis ground.

An external modem is typically a DCE DB-25-pin female connector.

DB-25 DC	ACUXL Controller	ACURS Controller	Description
2	H1TD (TB1-18)	TXD (TB1-2)	Transmit Data
3	H1RD (TB1-19)	RXD (TB1-3)	Receive Data
4	RTS1 (TB1-20)	RTS (TB1-4)	Request to Send
7	H1SG (TB1-17)	SIG GND (TB1-1)	Signal Ground

Table 3-3: Host PC to ACU (RS-232)

NOTE: When using dial-up communication to ACUs, an external US Robotics Sportster modem must be used at the host. When using this modem, make sure that switches 5 and 6 are on and all other switches are OFF.

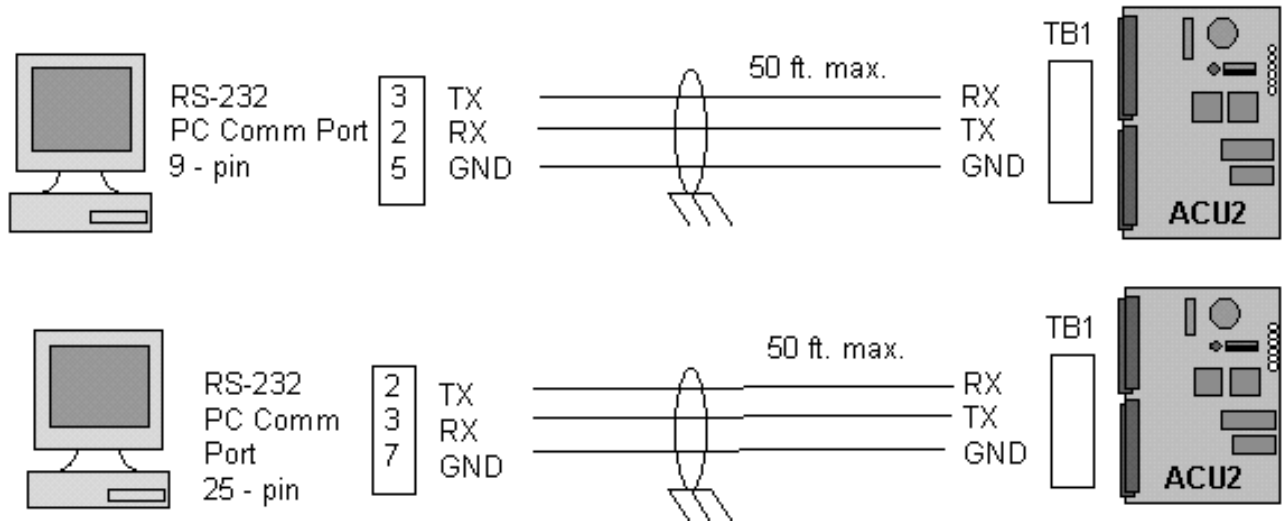
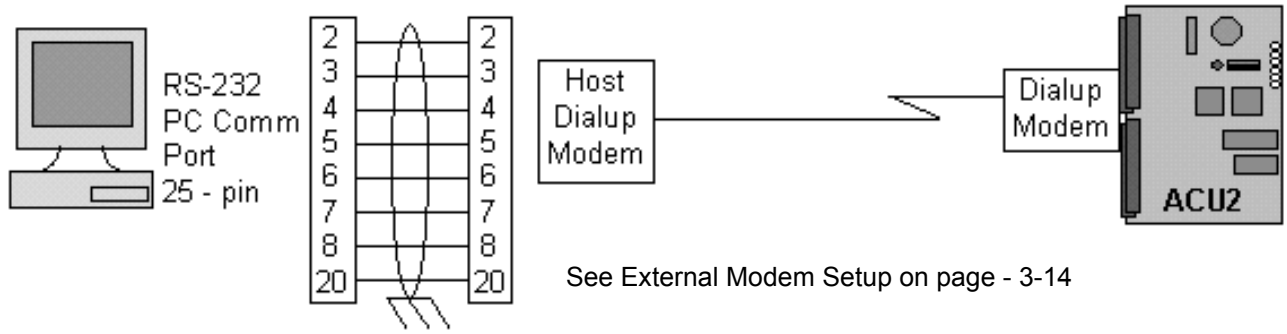


Figure 3-1: Typical Communication Wiring RS-232C Interface Between PC and ACU Controller.



See External Modem Setup on page - 3-14

Figure 3-2: Typical Communication Wiring RS-232C Interface Between PC and Host Dialup Modem.

RS-485 Interface to the ACU Controller

When GE Security software is to communicate to multiple ACU controllers or the ACU controller is further than 50 ft. (15 m) from the server, then RS-485 must be used to communicate to the ACU controller.

Configure the ACU controller for RS-485 communication and wire the units as shown in Figure 3-3 or Figure 3-4. On the ACU, only the farthest unit on the communication line has the RS-485 terminated. The maximum overall length of this cable, from the GE Security server to the ACU controller is 4000 ft.) (1220 m). Beyond this distance, modems or line drivers must be used. If the installation site is to be UL 1076 and/or UL 294 approved, the use of modems and/or line drivers is not allowed, therefore the maximum distance between the host and the ACU is 4000 feet.

Pull in 2-pair, shielded cable (five wires) between the host communication ports and the ACU controller.

NOTE: Communication cable can be T-Tapped, but the tap cannot exceed 10 feet.

B&B RS-485 Converters to the Server

This section contains instructions on installing and wiring the B&B RS-485 Converter. The B&B RS-485 Converter installations have not been evaluated by UL. The B&B RS-485 Converter may not be installed if the installation is to be UL 1076 and/or UL 294 approved.

When a GE Security host computer is communicating to multiple ACU controllers that is further than 50 ft. (15 m), then RS-485 must be used. The installer must connect an RS-232C-to-RS-485 Converter.

GE Security currently supports four different B&B Converters, please check the table heading for the converter you are using.

- B&B Model 485CSP, Part Number PC-NCIC5C-PER

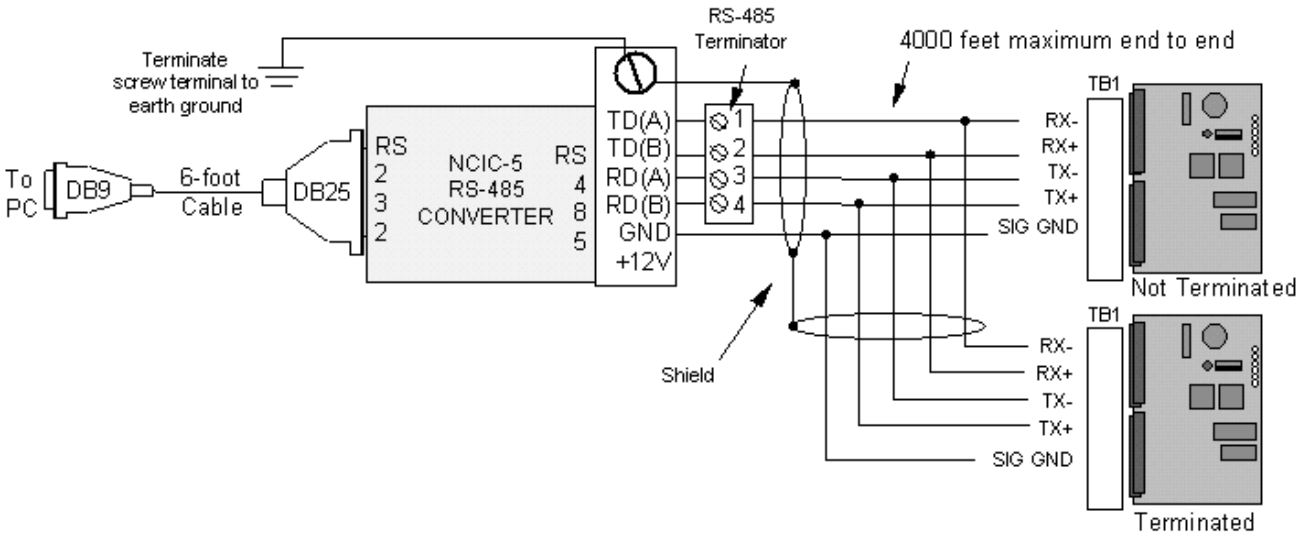
Configure the ACU controller for RS-485 communication and wire the units as shown in Figure 3-3 and Figure 3-4. Only the farthest unit on the communication line requires RS-485 to be terminated. The maximum overall length of this cable (from B&B Converter to ACU controller is 4000 ft.) (1220 m). Beyond this distance, modems must be used.

Wiring B&B 485CON and 422LCOR

485CON or 422LCOR DB-25 pin numbers	ACUXL Controller	ACURS Controller	Description
7	H1SG (TB1-17)	SIG GND (TB1-1)	Signal Ground
17	H1T+ (TB1-21)	TX+ (TB1-6)	Transmit Data (+)
5	H1T- (TB1-22)	TX- (TB1-7)	Transmit Data (-)
14	H1R+ (TB1-23)	RX+ (TB1-8)	Receive Data (+)
2	H1R- (TB1-24)	RX- (TB1-9)	Receive Data (-)

Table 3-4: B&B Model 485CON or 422LCOR to ACUXL and ACURS

NOTE: Communication cable can be T-Tapped, but the tap cannot exceed 10 feet.



NOTE: See Table 3-67 to terminate the last panel

Figure 3-3: B&B Model 485CON to ACU

Wiring B&B 485CSP

485CSP DB-25 pin numbers	ACUXL Controller	Description
FR. GND	Earth Ground	Shield
RDB	H1TD+ (TB1-21)	Transmit Data (+)
RDA	H1TD- (TB1-22)	Transmit Data (-)
TDB	H1RD+ (TB1-23)	Receive Data (+)
TDA	H1RD- (TB1-24)	Receive Data (-)
+12 VDC		+12 Volt
GND	H1SG (TB1-17)	Power Supply Common

Table 3-5: B&B Model 485CSP to ACU

Jumpers on 485CSP

Echo	ON
Control	Remove

LED's on 485CSP

TD Enable	ON
RD	Flashes when polls are received

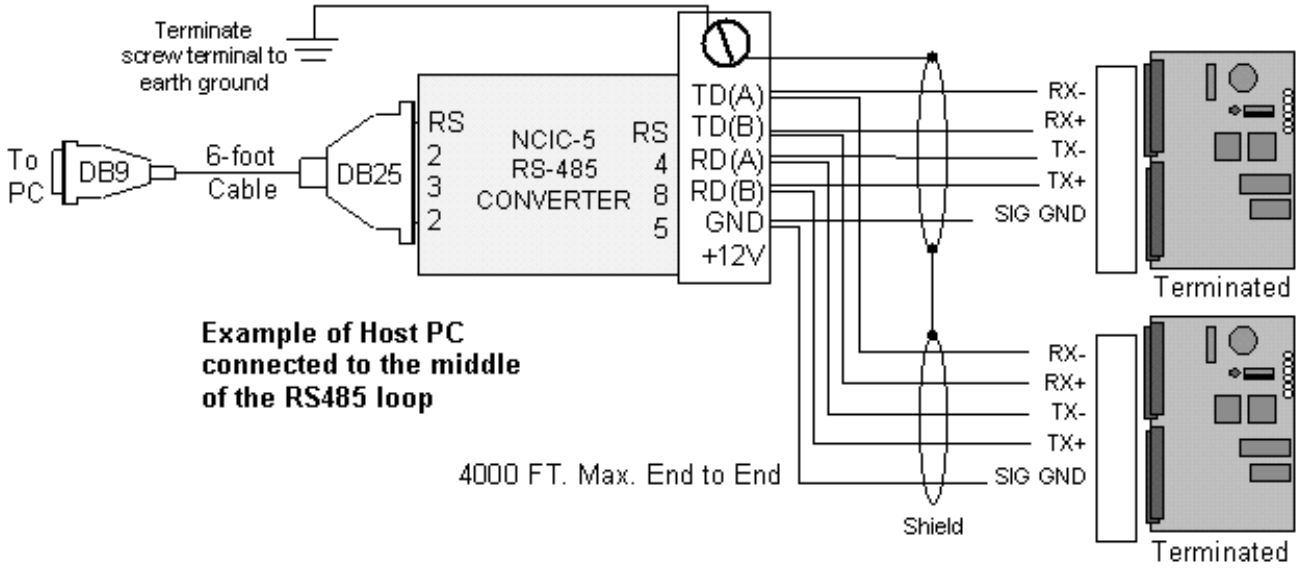


Figure 3-4: B&B Model 485CSP to ACU

NOTE: See Table 3-67 to terminate the last panel.

Use Table 3-6 to Table 3-9 to connect a PC to the B&B converter. Communication port 1 on a Personal Computer is typically a 9-pin male connector. Connect the B&B converter as follows, shown in Tables below depending on the converter you are using. If you are using the B&B Model 485CON, then a 9-to-25 pin cable and a gender changer is required. If you are using B&B Model 485CSP or 422LCOR, then use a 9 to 25 pin cable.

DB-9 DTE Pin numbers Male	B&B Converter 485CON 25-pin male
2	3
3	2
5	7
7	4

Table 3-6: DB-9 Connection for 485 CON.

DB-9 DTE Pin numbers Male	B&B Converter 485CSP or 422LCOR 25-pin female
2	3
3	2
5	7
7	4

Table 3-7: DB-9 Connection for 485 CSP and 422 COR

Communication port 2 on a Personal Computer is typically a 25-pin male connector. Connect the B&B converter as shown in Table 3-8 or Table 3-9 depending on the converter you are using. If you are using the B&B Model 485CON, then a gender changer is required. If you are using B&B Model 485CSP or 422LCOR, then the converter can be plugged directly into Communication port 2.

DB-25 DTE Pin numbers Male	B&B Converter 485CON 25-pin male
2	2
3	3
4	4
7	7

Table 3-8: DB-25 Connection for 485 CON.

DB-25 DTE Pin numbers Male	B&B Converter 485CSP or 422LCOR 25-pin female
2	2
3	3
4	4
7	7

Table 3-9: DB-25 Connection for 485 CSP and 422 COR.

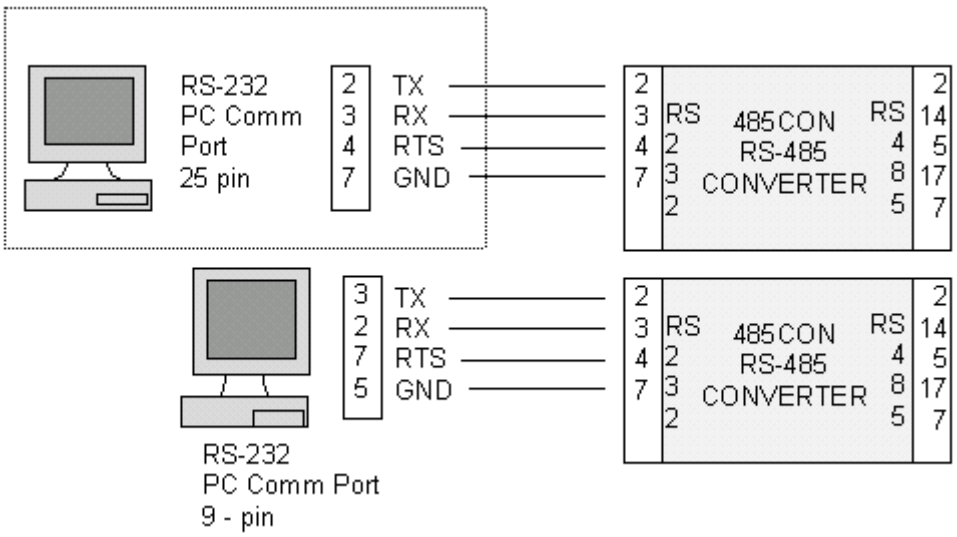


Figure 3-5: Personal Computer to B&B Converter

ACUXL Networked Controllers

The ACUXL has a built-in LAN connection which allows the ACUXL to communicate over a LAN or WAN and a local parallel printer port. The ACUSL is available in a 16-reader version ACUXL/16 (ACU-XL16B).

ACUXL Component Location

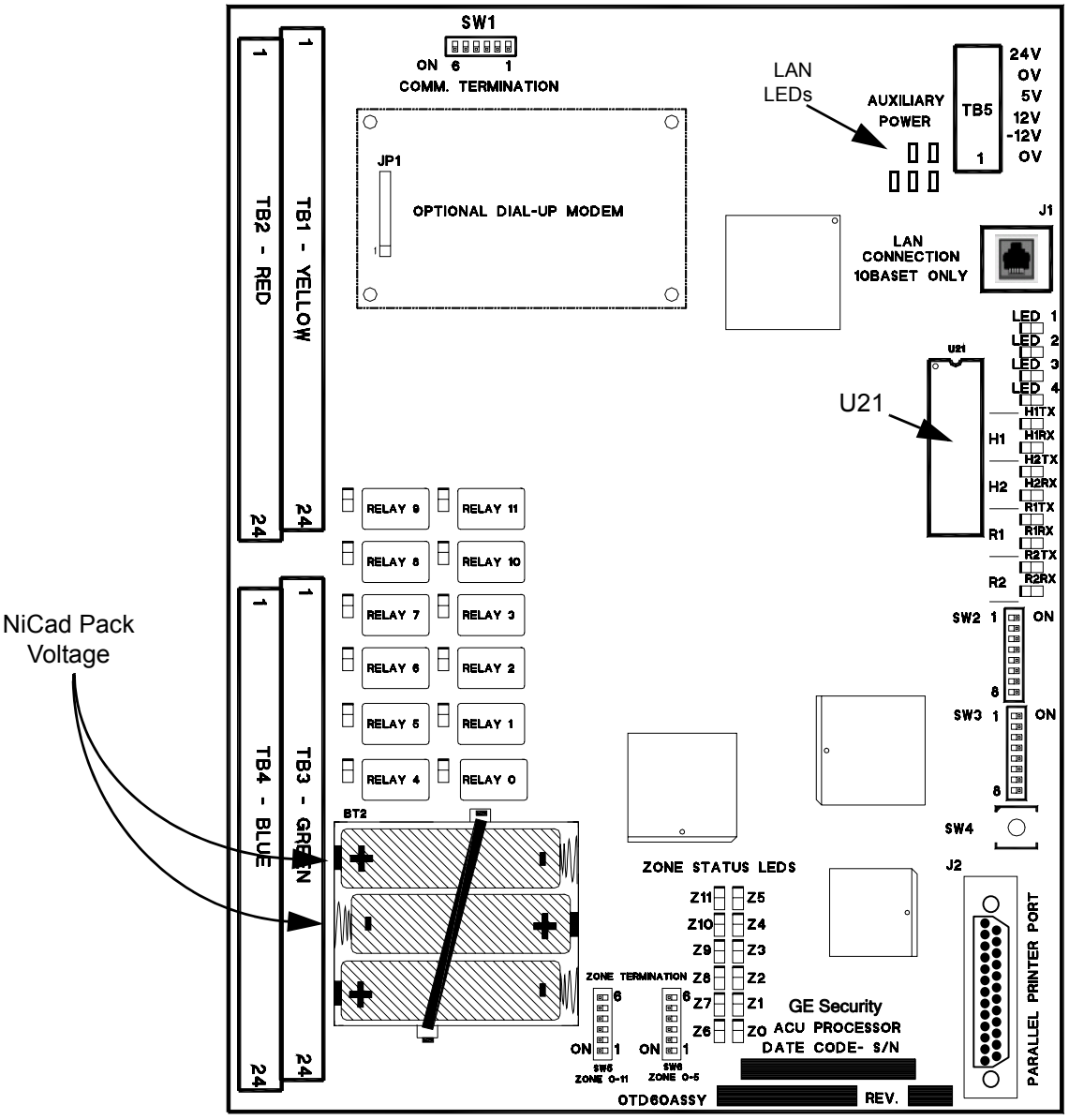


Figure 3-6: Component Layout on the ACUXL Controller

Multi-dropping RS-485 from LAN Connected ACUXL

You may still multi-drop any ACU from an ACUXL connected to the LAN via RS-485 up to a maximum of 4,000 feet to the last ACU from the ACUXL. See the wiring diagram below and the wiring table that follows.

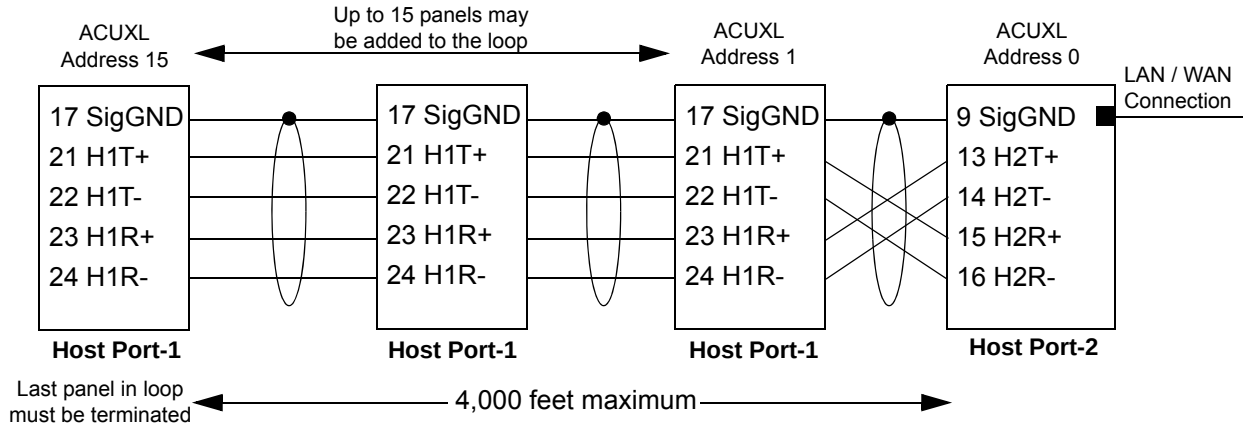


Figure 3-7: Multi-drop RS-485 From LAN Connected ACUXL

NOTES:

1. SW3 DIP switch 1 must be ON to enable the LAN connection.
2. When the LAN connection is enabled only Host Port 2 may be used to multi-drop additional ACUs.
3. ACURS2 or ACURS4 may also be connected to the RS485 port. See Table 3-44 for proper TB connections.

LAN ACU Connector TB1	To 2nd ACU Connector TB1	To 3rd ACU Connector TB1	To 4th ACU Connector TB1
9 - GND	17 – GND	17 – GND	17 – GND
15 – H2R+	21 – H1T+	21 – H1T+	21 – H1T+
16 – H2R-	22 – H1T-	22 – H1T-	22 – H1T-
13 – H2T+	23 – H1R+	23 – H1R+	23 – H1R+
14 – H2T-	24 – H1R-	24 – H1R-	16 – H1R-

Table 3-10: ACUXL RS-485 Wiring From LAN Connected ACUXL.

Printer Port

The parallel printer port on the ACUXL board is a Female 25-D connector and uses a standard printer cable limited to a maximum distance of 12 feet.

Table Table 3-11 through Table 3-16 describe how each DIP switch (SW1- SW6) is set. The rotary switch (SW4) described in Table Table 3-14 which provides sixteen addresses; 0 to 15 (0 to 'F' hexadecimal) for ACU addressing.

NOTE: Switches SW2 through SW4 are read only at power-up (or reset) and are ignored thereafter. When switch settings are changed, power MUST be turned OFF then turned ON AFTER the settings are changed.

ACUXL DIP Switch 1 Settings

Switch SW1	Switch Setting	Function
S1	ON*	Reader Port 1 RCV data Termination ON
S2	ON*	Reader Port 1 XMT data Termination ON
S3	ON*	Reader Port 2 RCV data Termination ON
S4	ON*	Reader Port 2 XMT data Termination ON
S5	ON*	Host Port 1 RCV data Termination ON
S6	ON*	Host Port 1 XMT data Termination ON
S7	ON*	Host Port 2 RCV data Termination ON
S8	ON*	Host Port 2 XMT data Termination ON

Table 3-11: DIP Switch SW1 Settings on the ACUXL Controller

* Denotes default setting.

ACUXL DIP Switch 2 Settings

Switch SW2	Switch Setting			Function
S1 through S3	S1	S2	S3	Host Communication Baud Rate
	OFF	OFF	OFF	19,200
	ON	OFF	OFF	38,400
	OFF	ON	OFF	57,600
	ON	ON	OFF	1,200
	OFF	OFF	ON	115,200
	ON	OFF	ON	2400
	OFF	ON	ON	4800
	ON[1]	ON[1]	ON[1]	9600
S4	ON			Host Encryption enabled
	OFF[1]			Host Encryption disable
S5	ON			Dial-Up Host Communications
	OFF[1]			Dedicated Host Communications
S6	ON			Multi-drop Modem connected, use 5-wire RS-232 using RTS & CTS
	OFF[1]			Use RS-485 or 3-wire RS-232
S7	ON			LAN and Serial port H1 dual reporting path[2]
	OFF[1]			Serial port H1 and H2 dual reporting path[3].
S8	ON			Host Communication uses No Parity
	OFF[1]			Host Communication uses Even Parity

Table 3-12: DIP Switch SW2 Settings on the ACUXL Controller

1 Denotes default setting.
2 SW3 switch 1 must be ON indicating that LAN is enabled. This setting applies to ACUXL version 7.09.00 or later.
3 SW3 switch 1 must be OFF indicating that LAN is disabled. This setting applies to ACUXL version 7.09.00 or later.

ACUXL DIP Switch 3 Settings

Switch SW3	Switch Setting	Function
S1	ON	LAN Enabled
	OFF*	Serial SCP Enabled
S2	ON	Allow LAN IP parameter update
	OFF*	
S3	ON	Use default LAN IP parameters
	OFF*	
S4	ON	Triple DES (TDES)
	OFF*	Standard DES
S5	ON	
	OFF*	Spare Leave OFF
S6	ON	
	OFF*	Spare Leave OFF
S7	ON	Battery Backup on Memory Enabled
	OFF*	
S8	ON	Watchdog Timer Disabled
	OFF*	Watchdog Timer Enabled

Table 3-13: DIP Switch SW3 Settings on the ACUXL Controller

* Denotes default setting.

ACUXL DIP Switch Address Setting

SW4 (rotary switch)	Function
0 - F	Sets the polling address

Table 3-14: Rotary Switch SW4 Settings on the ACUXL

ACUXL DIP Switch Zone Input Termination settings

SW5	Adds 1 K ohm across zone inputs
S1 ON	Zone 6 Terminated
S2 ON	Zone 7 Terminated
S3 ON	Zone 8 Terminated
S4 ON	Zone 9 Terminated
S5 ON	Zone 10 Terminated
S6 ON	Zone 11 Terminated

Table 3-15: DIP Switch SW5 Add EOL Termination to Inputs

DIP switch factory default is all OFF

SW6	Adds 1 K ohm across zone inputs
S1 ON	Zone 0 Terminated
S2 ON	Zone 1 Terminated
S3 ON	Zone 2 Terminated
S4 ON	Zone 3 Terminated
S5 ON	Zone 4 Terminated
S6 ON	Zone 5 Terminated

Table 3-16: DIP Switch SW6 Add EOL Termination to Inputs

DIP switch factory default is all OFF

Dial-up Modem Card for ACUXL, ACURS2, and ACURS4

The optional daughter board Dial-Up modem (ACU-MODEM) can be easily installed into the ACUXL, ACURS2, or ACURS4 controller.

This section contains instructions on installing the Dial-up modem card. The Dial-up modem card and installations have not been evaluated by UL. A battery backup or USP is recommended for any device using dial-up.

NOTE: The Dial-up modem card may not be used if the installation is to be UL 1076, UL 294 or CE approved.

Dial-up Modem Installation for ACUXL Controller

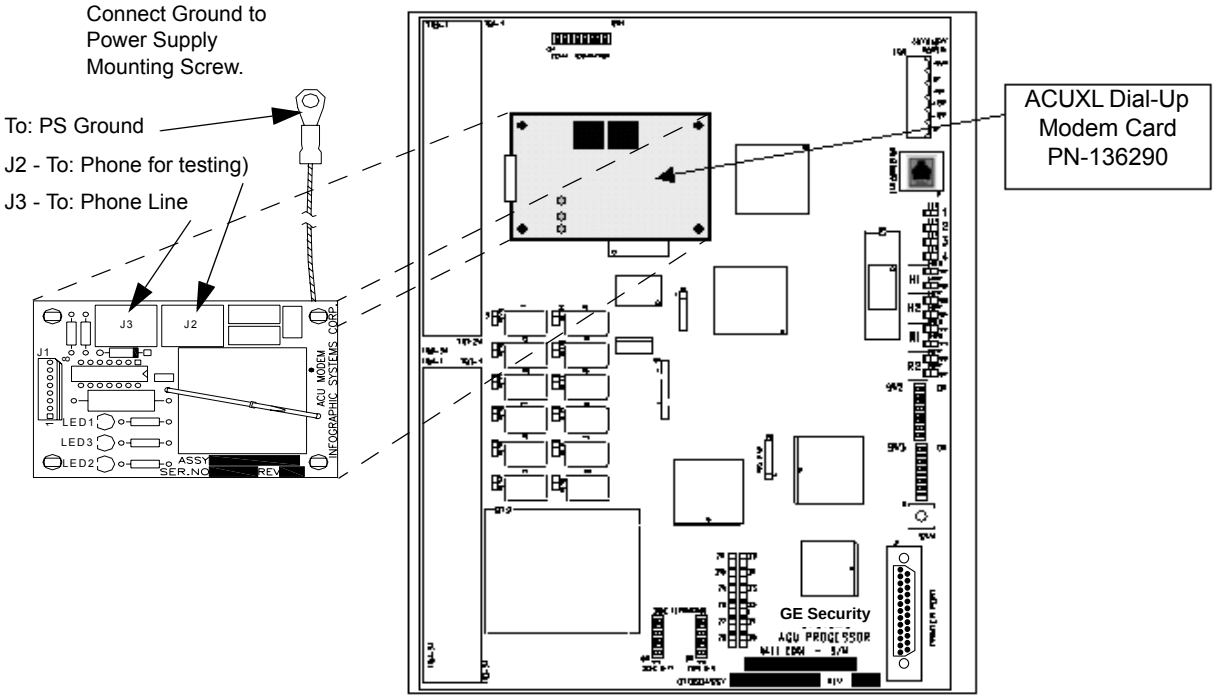


Figure 3-8: ACUXL PAC D1 Dial up Modem Card Location

The Dial-up modem installation and wiring connection in the ACUXL Controller Enclosure is made as follows:

1. Insert the standoffs that were shipped with the modem board in the four holes in the upper left section of the ACUXL board.
2. Then while making sure the pins on the ACUXL board line up to the connector on the modem board, plug-in the modem board and snap the board on to the standoffs.
3. Connect the dial-up phone line to either RJ-11 telephone connector on the ACUXL Dial-up modem board.

NOTE: Phone lines used for Dial-up should be dedicated analog lines and not routed through a PBX or multi-plexer

4. **SW2** on the ACUXL should be set as follows: **1,2,3, 5,** and **8** set to "**ON**".
5. The systems administrator will need to know the ACUXL Controller's Serial Number. The serial number is located on top of the ACUXL controller board.

Connecting the Dial-up Modem

Connect the modem board's frame ground wire to the grounding lug in the cabinet just above the board. See Figure 3-13.

Connect the modem to a standard dial type telephone line by plugging the phone line's RJ45 connector into J3. A telephone instrument for testing can be connected to J2.

NOTE: DO NOT use PBX or Key Switch type phone lines.

Component Layout

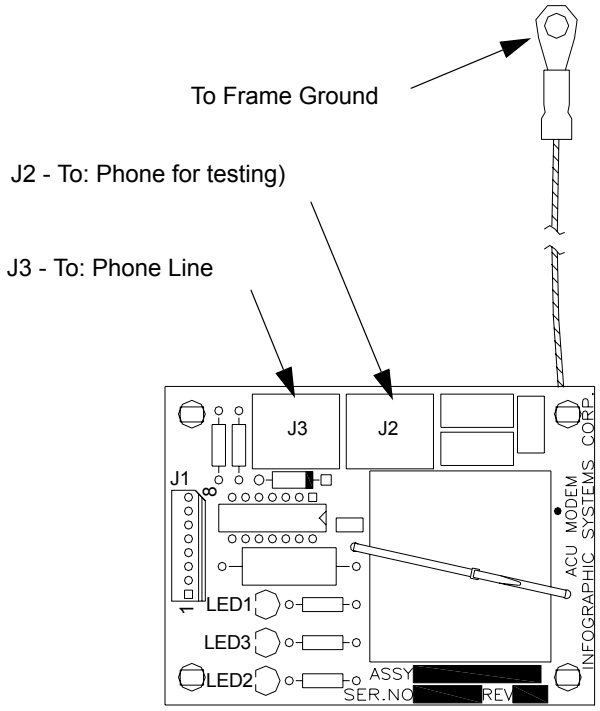


Figure 3-9: Component Layout of the Dial-up Modem Board

LEDs on Modem Board

The LEDs will show the modem status and help in trouble shooting the modem.

LED's on Modem	Description
LED1	Power - Lights when modem is "powered".
LED2	Ring Detect - Lights when the modem has called.
LED3	Carrier Detect - Lights when the Modem has established communication with the host modem.

Table 3-17: Dial-up Modem LED Indicators.

Connecting (MDD) Multi-Drop Dial-Up Panels

The dial-up ACUXL/16 panel may have up to 15 additional ACUXL panels multi-dropped to its RS485 port as shown below. However, the ACURS dial-up panel may only have 14 additional MDD panels connected.

The additional panels must be configured in the server software as dial-up panels with the same phone number as the panel with the dial-up modem card installed.

NOTE: DO NOT use PBX or Key Switch type phone lines.

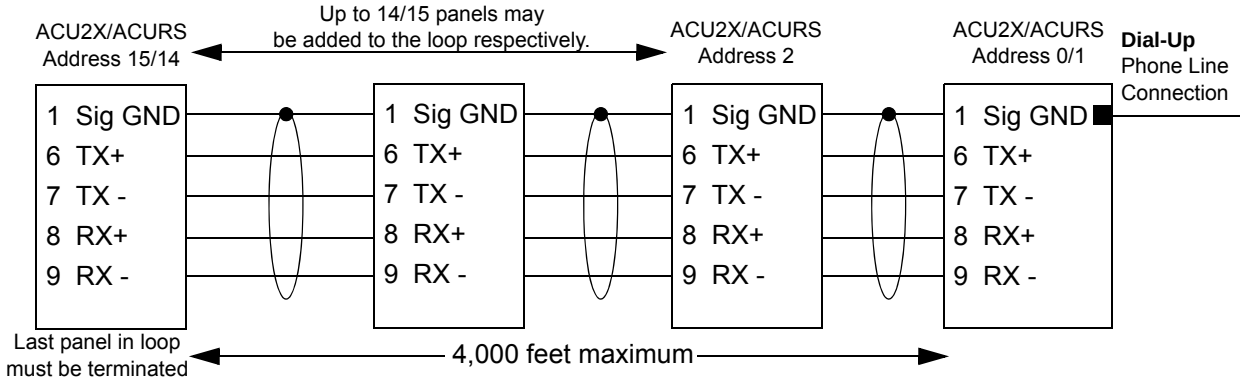


Figure 3-10: RS485 Port Wiring For Multi-Drop Dial-Up Panels

In the above configuration if the panel with the dial-up modem installed is ACURS2/4 it must be set as address "1" and each additional multi-drop panel on the RS485 port must be addressed starting with "2" then "3" and so on up to 14 additional ACURS panels maximum.

If using an ACUXL panel with the dial-up modem installed, then the first panel should be addressed "0" then each additional multi-drop panel on the RS485 port must be addressed starting with "1" then "2" and so on up to 15 additional ACUXL panels maximum.

Installing Server External Modem

When using Dial-up communications to an ACUXL or ACURS2/4 field panel you must install an external modem (PC-EMODEM-PER) at the server. The server software will ONLY support the (USR) US Robotics 33.6 faxmodem or the 56K V.90 faxmodem, Sportster modem models 0701 (005686-03) or 0459 (00083907).

Model information located on the back of the modem near the FCC logo sticker, there are some numbers, model #0459 and Sportster 0083907 (the current model is 000839-09 from the USR web site). The 56K V.90 faxmodem can also be used. The number on the back is model #0701 Sportster 005686-03 (USR5686E from the web site).

NOTE: DO NOT use internal modem cards or external modems without dipswitchs.

Information on these modems may be found at the US Robotics web site, **www.usr.com**. Click on **U.S./Canada (English)**, then click **Search Site** tab at the top of the page, then type **sportster 005686-03** or **sportster 00568** into the search field.

For external modem wiring diagram, see Figure 3-2 on page- 3-3.

External Modem Setup

The switches on the back of the modem must be configured with switches 5 and 6 set to the UP position, all others should be in the down position as shown to the right.

NOTE: You will NOT need to install the modem or drivers in Windows.

When you power up the external modem LEDs AA, TR, and CS should be illuminated, all other should be off.

Software Setup

After installing the modem make sure dial-up panels are configured in the Topaz server software as SCP Dial-Up, set to 9600 baud, No parity and Active.

From Control and Service Functions, you must setup the modem. Choose Initialize - Test Modem and Serial Port and say Go. The modem LEDs SD and RD should blink several time. This sends the correct AT commands necessary for the modem to work correctly.

NOTE: It is recommended you use a minimum of two dial-up ports/modems for data and alarms. As the system grows or as the alarm load increases, it may be necessary to use more Server modems to handle the traffic.

The system administrator will also need to know the ACUXL or ACURS2/4 Controller's Serial Number.

Troubleshooting

Be sure the external dial-up modem at the server is connected correctly.

Check the dial-up modem board in the ACURT to make sure it is firmly install on the pins J1 and no pins are bent over.

Make sure the ACURT modem board is properly grounded.

You may have to clear memory on the ACU board.

NOTE: Be aware this action will leave the ACU without any configuration.

LAN Connection for ACUXL Version

The ACUXL version has a built-in LAN connection. If UL listed installation Triple DES (TDES) Encryption is required.

LAN Surge Protector ACU Installation

LAN surge protection must be installed at all ACUs communicating over the LAN for all UL installations. The Transtector TSJ45 series surge protector (GE Security part number 137206) is a plug-in silicon avalanche diode surge suppression system for networked equipment.

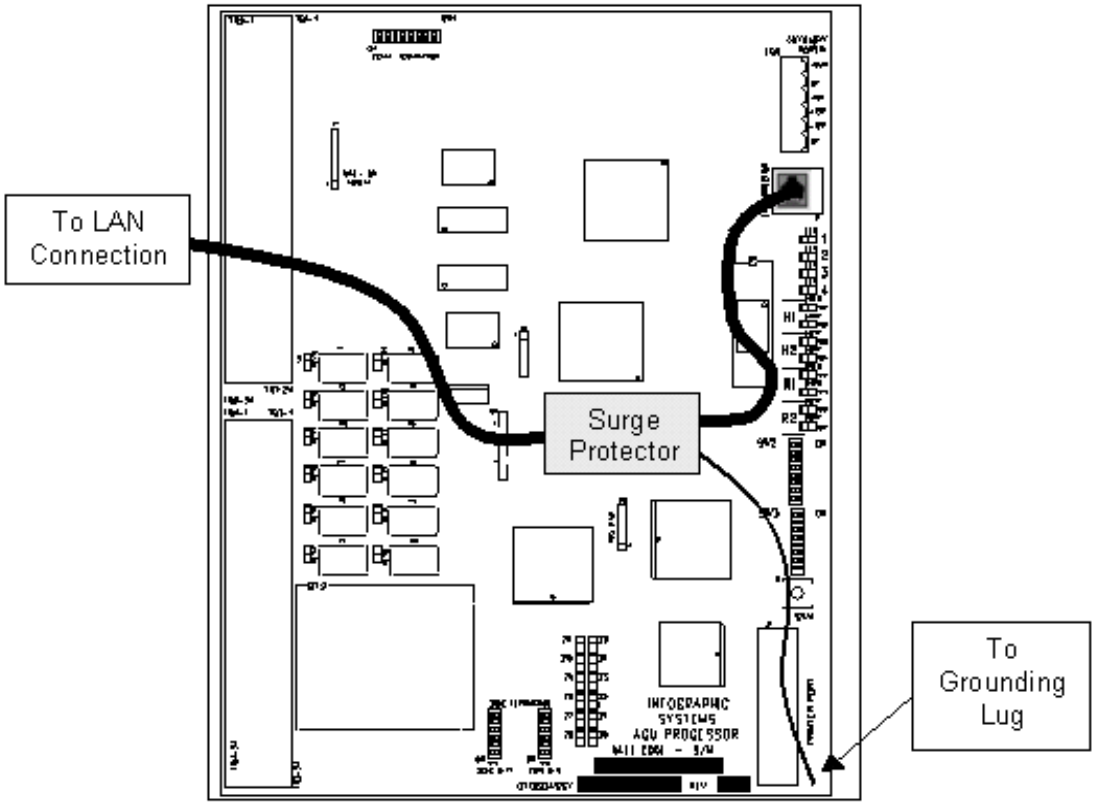


Figure 3-11: ACUXL Surge Protection Installed

LAN Surge Protector Server Installation

NOTE: Surge protection is not allowed if the system is to be CE approved.

LAN surge protection must be installed at the Server for all UL installations.

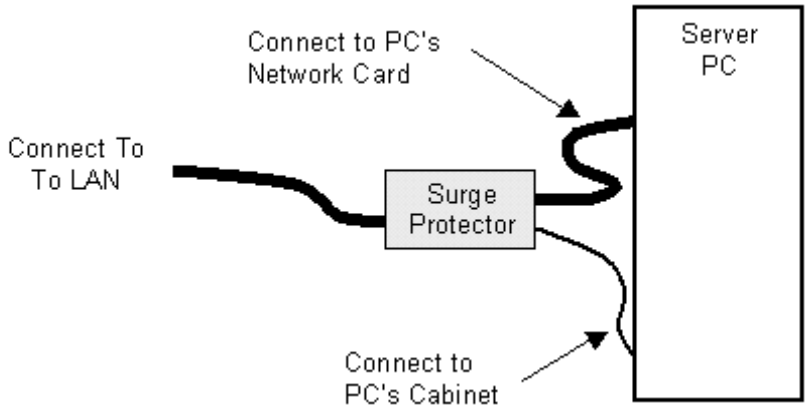


Figure 3-12: LAN Surge Protection Installed At Server PC

LEDs for LAN Connection

LED's for LAN	Description
D101	LAN TX (on indicates transmitting data to server)
D100	LAN RX (on indicates receiving data from server)
D14	LAN Collisions (on indicates collision)
D99	LAN Polarity (on indicates wires swapped)
D13	LAN Link (on indicates network detected)

Table 3-18: LAN Connection LED Indicators.

Location for LAN LEDs

Dual Reporting Paths

The ACUXL provides for dual reporting path function. When the primary reporting path from the ACU to the host computer fails, the secondary reporting path becomes available providing more secure, redundant communication. The communication may be two LAN connections, a primary LAN connection with a secondary LANtronix adaptor connected to serial port H1 or two serial port connections.

Dual LAN Reporting Path Setup

When both of the reporting paths will be on the LAN, serial port H1 will be wired to a LANtronix adaptor. See page 3-65. The IP address for both the on board LAN connection and the LANTronix unit are entered into DIAMOND II. This only requires that DIP switch SW3 switch 1 be set to **ON**. Also see Chapter 8 of the *DIAMOND II User Manual*.

Dual LAN/Serial Path Setup

When the primary reporting path should be the on board LAN, secondary communication will be serial port H1 wired to a LANtronix adaptor. To make the onboard LAN connection primary, set both DIP switch SW2 switch 7 and DIP switch SW3 switch 1 to **ON**.

Dual Serial Path Setup

When both of the reporting paths will use serial communications, wire both port H1 and H2 to the host PC using RS-485 wiring. Set both DIP switch SW2 switch 7 and DIP switch SW3 switch 1 to **OFF**. Also see Chapter 8 of the *DIAMOND II User Manual*.

LEDs for Alarm Zone Status

LEDs Z0 – Z11 Status of 12 Alarm points	OFF= Secure ON = Active FAST FLASH= Trouble (open or short, etc.) SLOW FLASH= Masked

Table 3-19: Alarm Zone Status LED indicators.

BT2 Battery Replacement

It is recommended that you replace the onboard AA memory backup batteries every 5 years with 3 NICAD, AA size, 1.2 volt, 500 MA hour, or larger batteries (SANYO N-700AAC or equivalent).

To replace the batteries:

1. If the ACU is not powered down while changing the batteries, the memory will be maintained.
2. Cut the nylon cable tie retaining strap, that holds the batteries in place.
3. Remove the AA batteries from the holder.
4. Place fresh AA batteries into the batter holder.
5. Install 2 new nylon cable tie retaining strap (Dennison 08-432 or equivalent).

Clearing the Memory on the ACUXL

To clear memory, first power off the ACUXL. Set the *even* switches (positions 2,4,6 & 8) on DIP switch SW2 to ON and the odd switches (positions 1,3,5 & 7) to OFF. Set the polling address of the blue Rotary Switch SW4 to F. Apply power to the ACUXL. Wait a minimum of 45 seconds for all memory to clear. LEDs 1-4 will blink together indicating that the operation is complete. Turn power off and reset switches SW2 and SW4 to the desired settings.

NOTE: When clearing memory on an ACUXL, the IP Address will also be cleared and will need to be reconfigured.

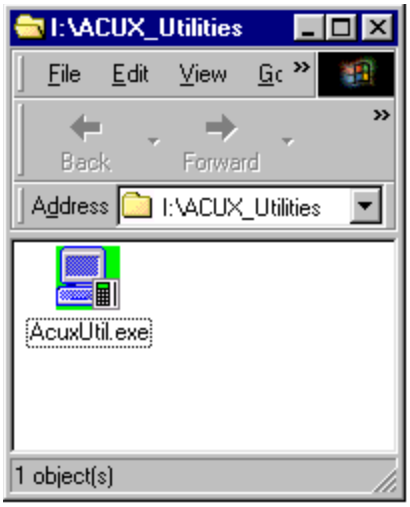
Setting TCP/IP Address for ACUXL/16, ACURS2, and ACURS4

Setting IP Address

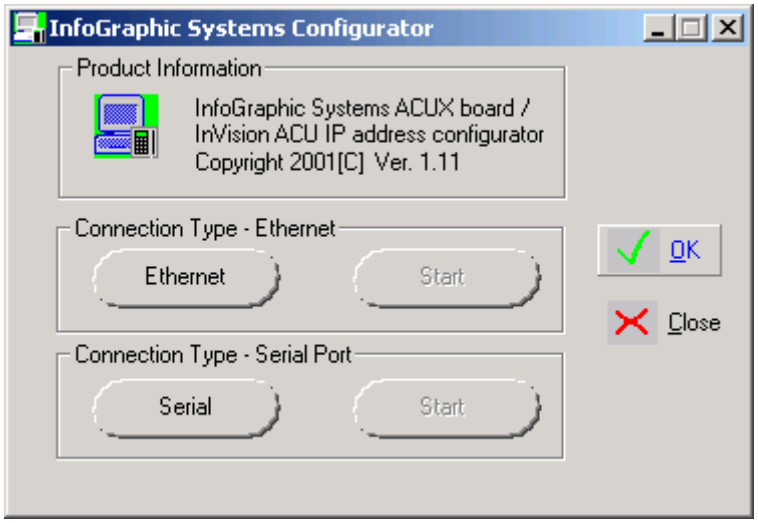
One of the simplest ways to set the IP address on the ACUXL is with a laptop computer in the field running the AcuxUtil.exe program.

If using the default IP address (SW3 switch 3 on) attach and configure only one ACUXL at a time.

To set up the TCP/IP address for a ACUXL field panel start by locating the **AcuxUtil.exe** file on the CD and start the utility by double-clicking on it's icon.



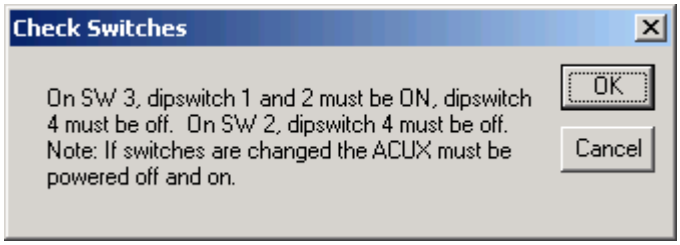
After starting the utility the following screen is displayed.



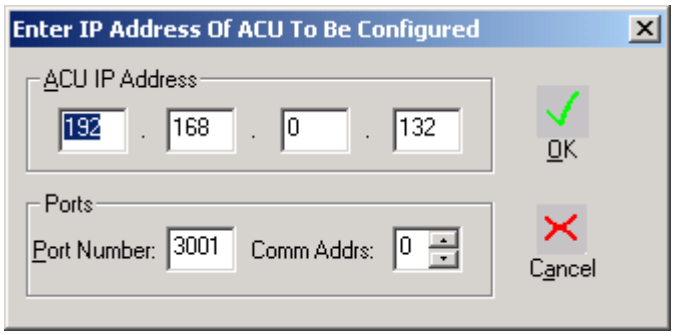
Set IP Address Through Ethernet

Before continuing make sure your PC has a network card installed with TIP/IP enabled. The IP address must be able to communicate to the ACUXL. In other words, the first three sets of numbers of the computer's IP address must match the first three sets on numbers of the ACUXL's IP address. The default IP address of the ACUXL is 192.168.0.132

1. Click the **Ethernet** button.

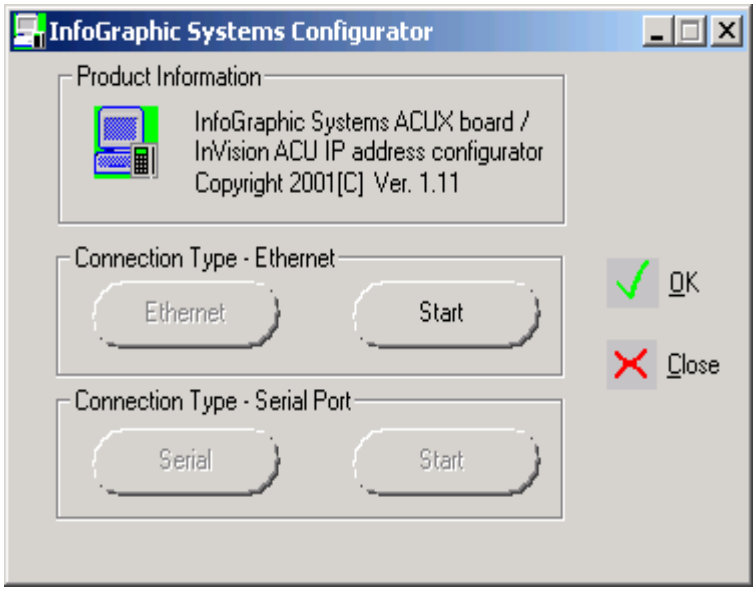

Check Switches
On SW 3, dipswitch 1 and 2 must be ON, dipswitch 4 must be off. On SW 2, dipswitch 4 must be off. Note: If switches are changed the ACUX must be powered off and on.
OK
Cancel

2. Make sure that SW2 DIP switch 4 is off, SW3 DIP switches 1 and 2 are ON, and SW4 is set to "0" before continuing.
3. After setting the switches reboot the ACU.
4. Power must be cycled on the ACUXL for the switches to be read.
5. After the switches are set properly, click **OK**.

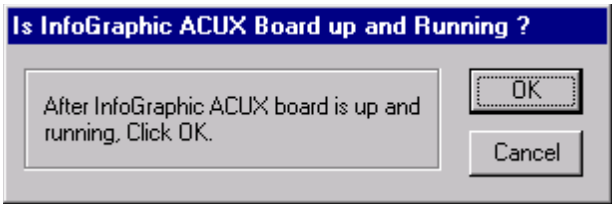


The IP Address of the ACUXL has been set at the factory to a default of 192.168.0.132.

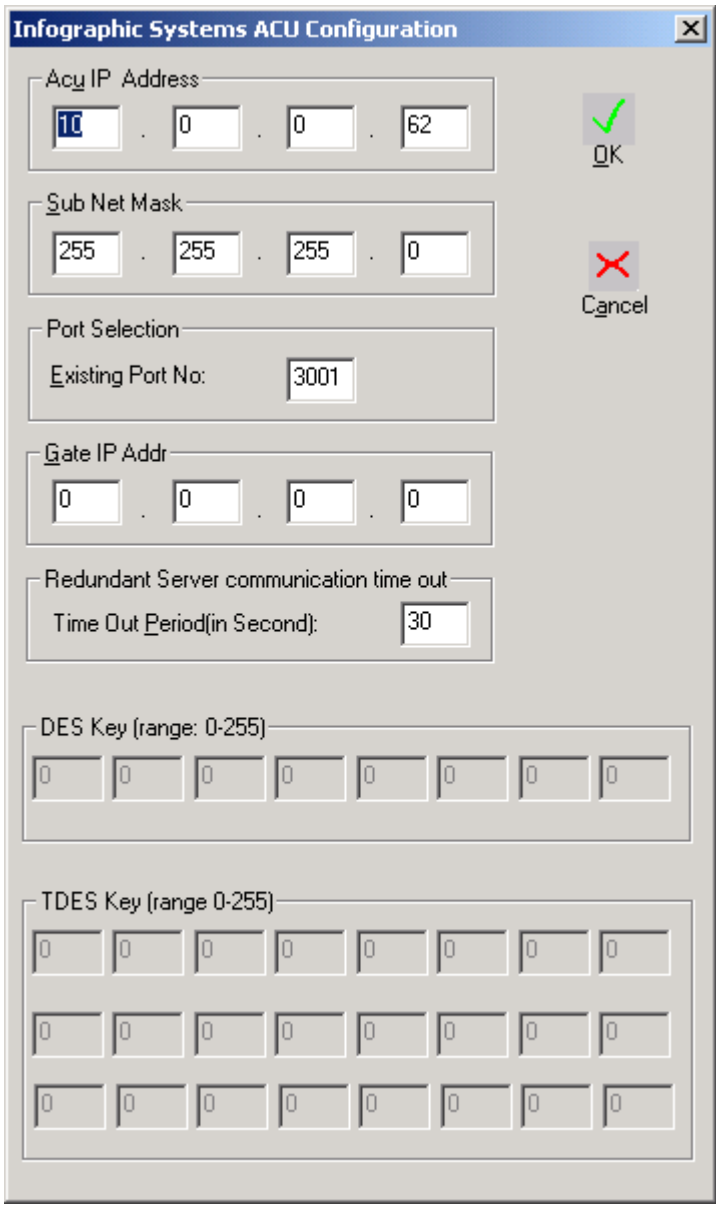
6. Enter the **IP address** for the ACUXL
7. The **Port Number** will be left at the default 3001 unless you have multi servers on your system. If using multi server change the last three digit (3000 plus the LAN number) of the Port Number to reflect the server number. For server number two the Port Number would be 3002.
8. If the ACU Comm Address (SW4) is set to other than "0" adjust the address here to match the ACU.
9. Click **OK** to continue.



10. Click **Start** button to start the configuration of the IP Address.



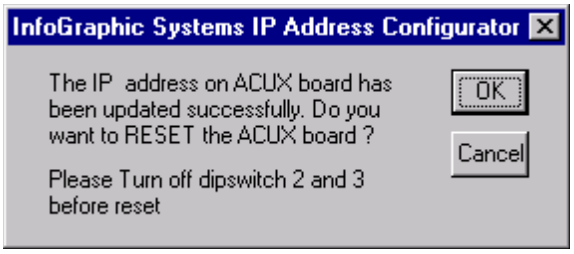
11. Make sure SW3 DIP Switches 1 and 2 are turned ON at the ACUXL and click **OK**.


Infographic Systems ACU Configuration
Acu IP Address
10 . 0 . 0 . 62
OK
Sub Net Mask
255 . 255 . 255 . 0
Cancel
Port Selection
Existing Port No: 3001
Gate IP Addr
0 . 0 . 0 . 0
Redundant Server communication time out
Time Out Period(in Second): 30
DES Key (range: 0-255)
0 0 0 0 0 0 0 0
TDES Key (range 0-255)
0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0

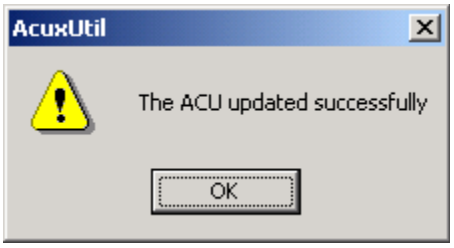
The addresses for this screen must be obtained from your MIS department.

12. Enter the new **ACUXL IP Address**, **Sub Net Mask**, **Gate IP Address** (Gateway or Router).
13. The **Existing Port No.** will be left at its default 3001 unless you have multi servers on your system. Change the last three digit of the Port No. to reflect the server number (3000 plus the LAN number). For server number two the Port No. would be 3002.
14. The **Time Out Period** is used for redundant systems only. The default is 30 Sec.
15. Click **OK** to continue.

16. The ACUXL was updated successfully.
17. Click **OK** to continue.


InfoGraphic Systems IP Address Configurator
The IP address on ACUX board has been updated successfully. Do you want to RESET the ACUX board ?
Please Turn off dipswitch 2 and 3 before reset
OK
Cancel

18. Before continuing, make sure DIP switches 2 and 3 at the ACUXL are turned OFF.
19. Click **OK** to continue and reset the ACUXL.

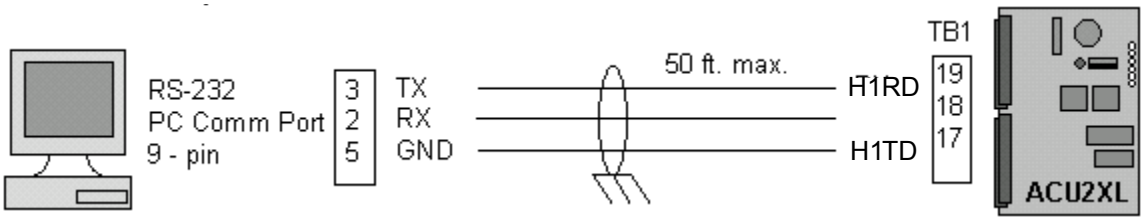


The ACUXL has been updated with the new IP address.

20. Click **OK** to complete the setup.

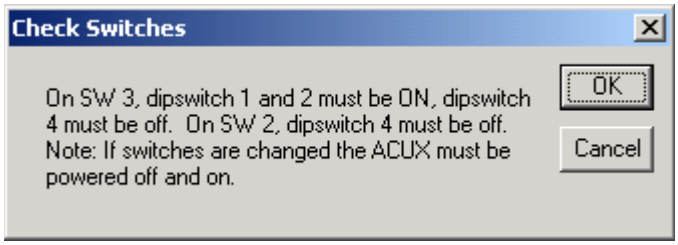
Set IP Address Through Serial Connection

Connect your PC to the ACUXL as shown below.

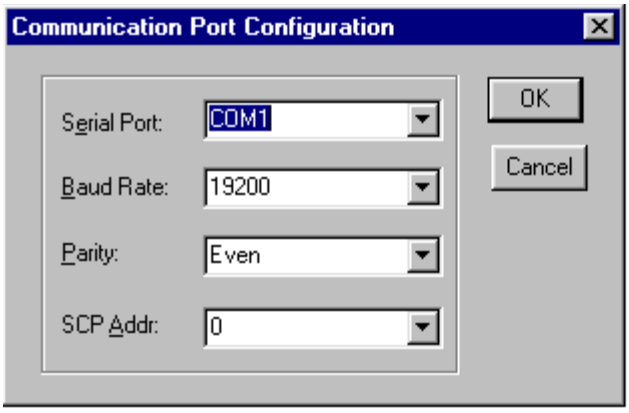


The ACUXL must be properly connected to the computer's serial port and power to the ACUXL must be turned on.

1. Click the **Serial** button.


Check Switches
On SW 3, dipswitch 1 and 2 must be ON, dipswitch 4 must be off. On SW 2, dipswitch 4 must be off. Note: If switches are changed the ACUX must be powered off and on.
OK
Cancel

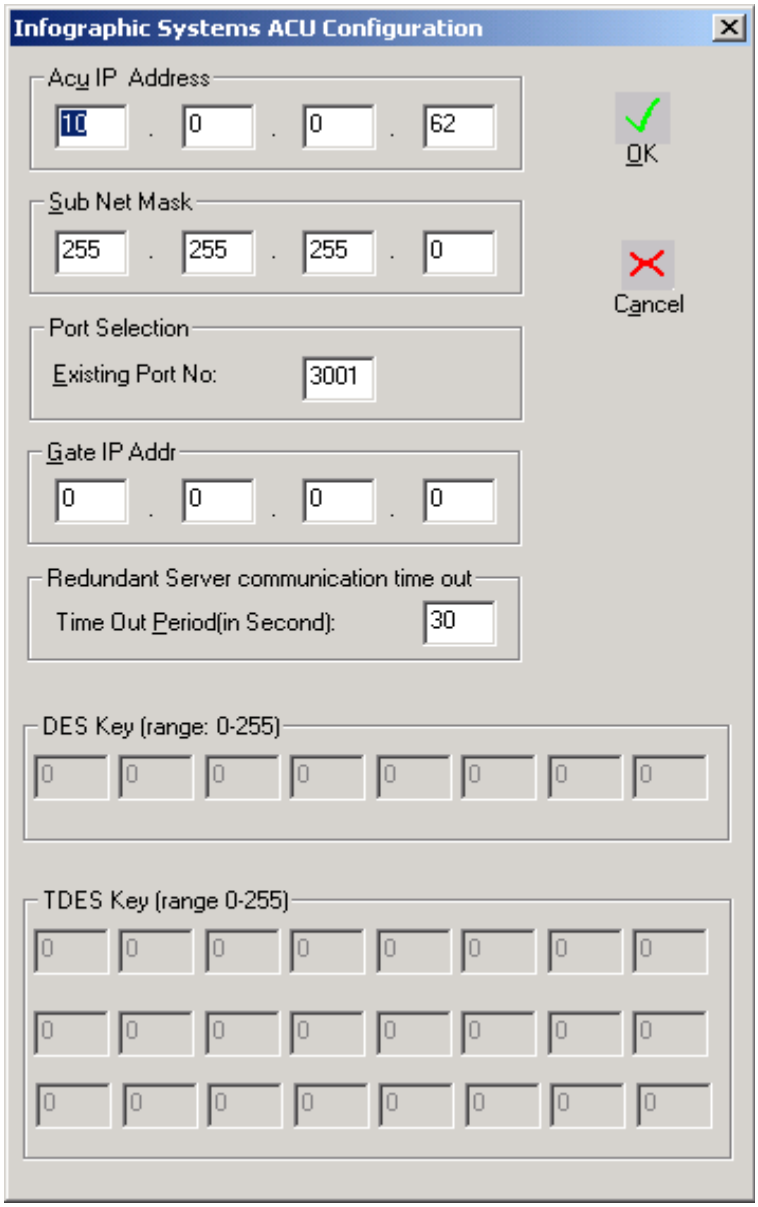
2. Turn SW3 DIP switch 1 OFF and 2 ON at the ACUXL.
3. Power must be cycled on the ACUXL for the switches to be read.
4. Click **OK** to continue.



5. Select the Communication port that the ACUXL is connected to.
6. Select the Baud Rate that the ACUXL set to communicate at.
7. Parity should be left at Even.
8. The SCP Address is the communication address the ACUXL is set at with SW4.
9. Click **OK**.

If the ACUXL is not communicating the following message will appear.

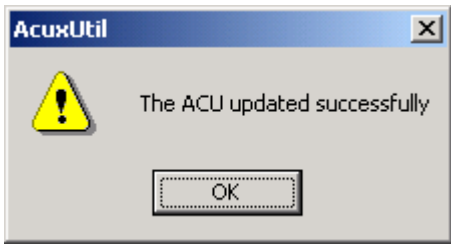
10. Click **OK** and check you Serial connection and try again.


Infographic Systems ACU Configuration
Acu IP Address
10 . 0 . 0 . 62
OK
Sub Net Mask
255 . 255 . 255 . 0
Cancel
Port Selection
Existing Port No: 3001
Gate IP Addr
0 . 0 . 0 . 0
Redundant Server communication time out
Time Out Period(in Second): 30
DES Key (range: 0-255)
TDES Key (range 0-255)

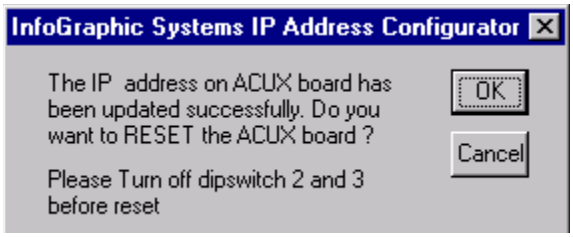
The addresses for this screen must be obtained from your MIS department.

The IP Address of the ACUXL has been set at the factory to 192.168.0.X. The X number is different for each ACUXL.

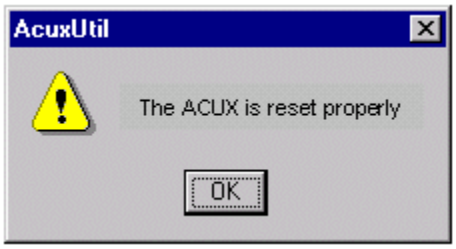
11. Enter the new **ACUXL IP Address**, **Sub Net Mask**, **Gate IP Address** (Gateway or Router).
12. The **Existing Port No.** will be left at its default 3001 unless you have multi servers on your system. Change the last three digit of the Port No. to reflect the server number (3000 plus the LAN number). For server number two the Port No. would be 3002.
13. The **Time Out Period** is used for redundant systems only. The default is 30 Sec.
14. Click **OK** to continue.



15. The ACU was update successfully.
16. Click **OK** to continue.


InfoGraphic Systems IP Address Configurator
The IP address on ACUX board has been updated successfully. Do you want to RESET the ACUX board ?
Please Turn off dipswitch 2 and 3 before reset
OK
Cancel

17. Before continuing, make sure DIP switches 2 and 3 at the ACUXL are turned OFF.
18. Click **OK** to continue and reset the ACUXL.



The ACUXL has been updated with the new IP address.

19. Click **OK** to continue.

ACURS2 and ACURS4 Controllers

Enclosure Layout

The ACURS2 and ACURS4 installations have not been evaluated by UL. The ACURS2 and ACURS4 may not be installed if the installation is to be UL 1076 and/or UL 294 approved.

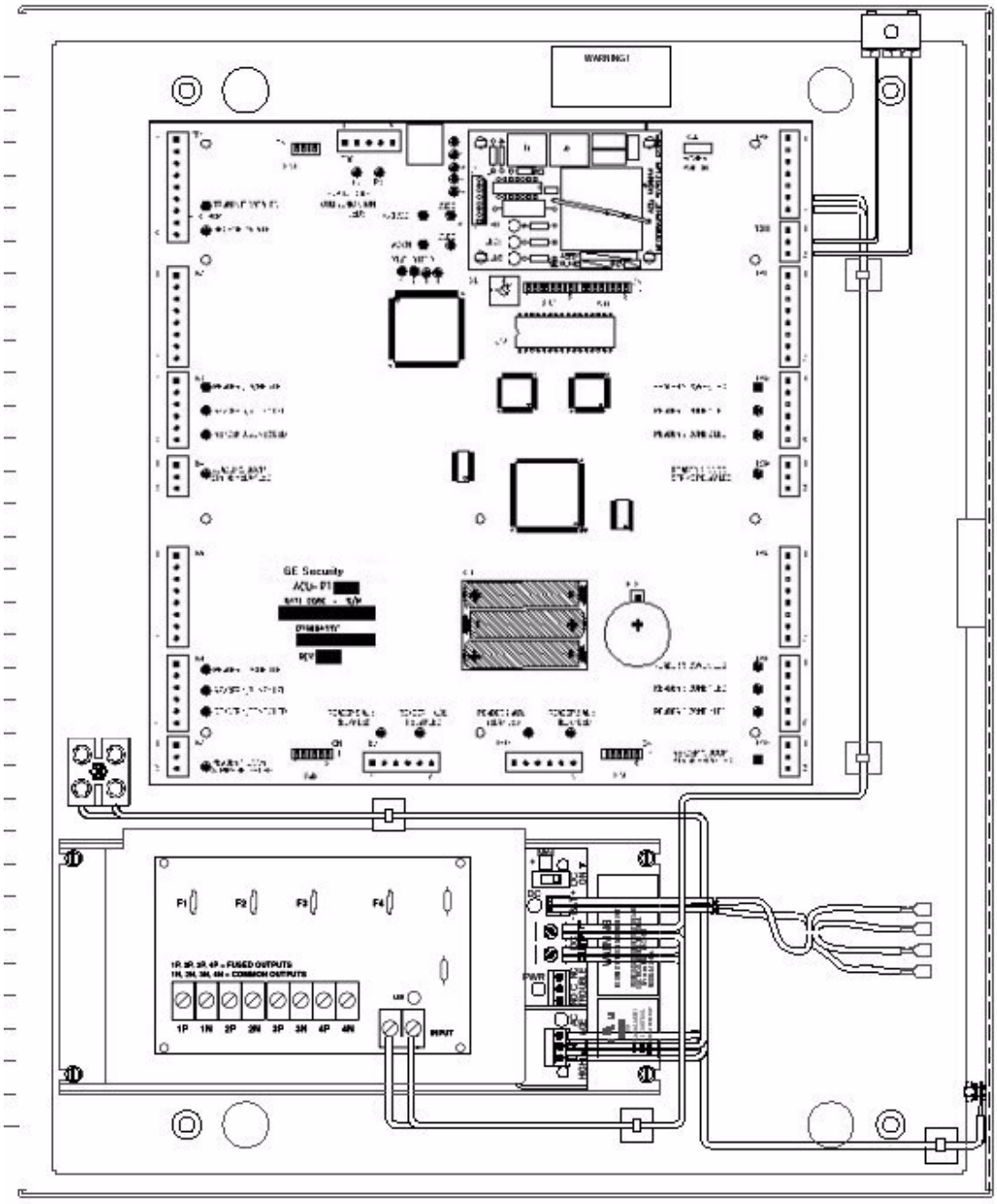


Figure 3-13: ACURS Controller Enclosure Layout

ACURS2 and ACURS4 Circuit Board Layout

For the location of components discussed in this section see Figure Figure 3-14 below.

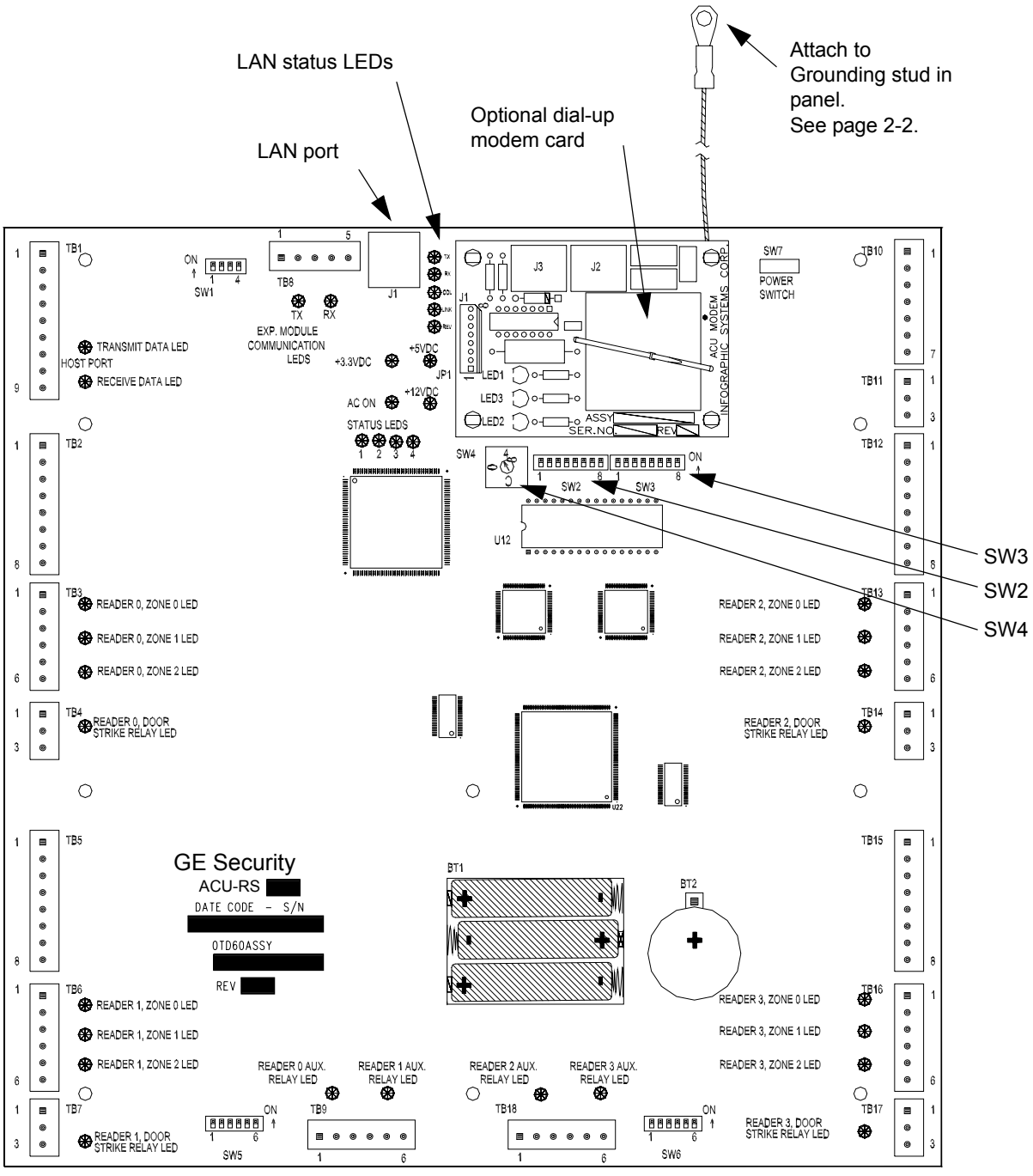
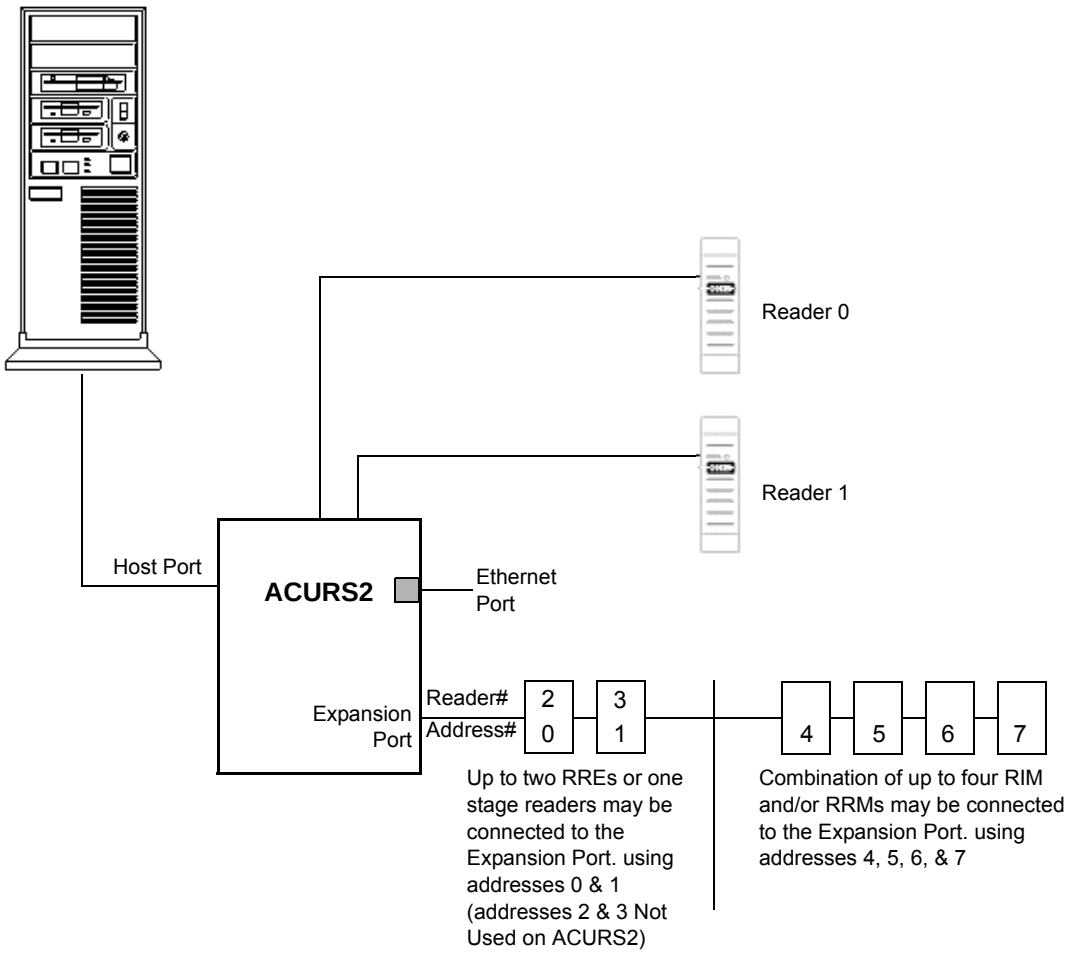


Figure 3-14: ACURS2 and ACURS4 Board Component Layout

ACURS2 Block Diagram



Features

- 1 - Host Port (RS-232 or RS-485)
- 1 - Ethernet Port
- 2 - Read Head Interface
- 1 - Expansion Module Port for up to 4 SMT RRMs or SMT RIMs and 2 Readers
- 6 - Alarm Inputs
- 4 - Relay Outputs

Figure 3-15: ACURS2 Block Diagram

ACURS4 Block Diagram

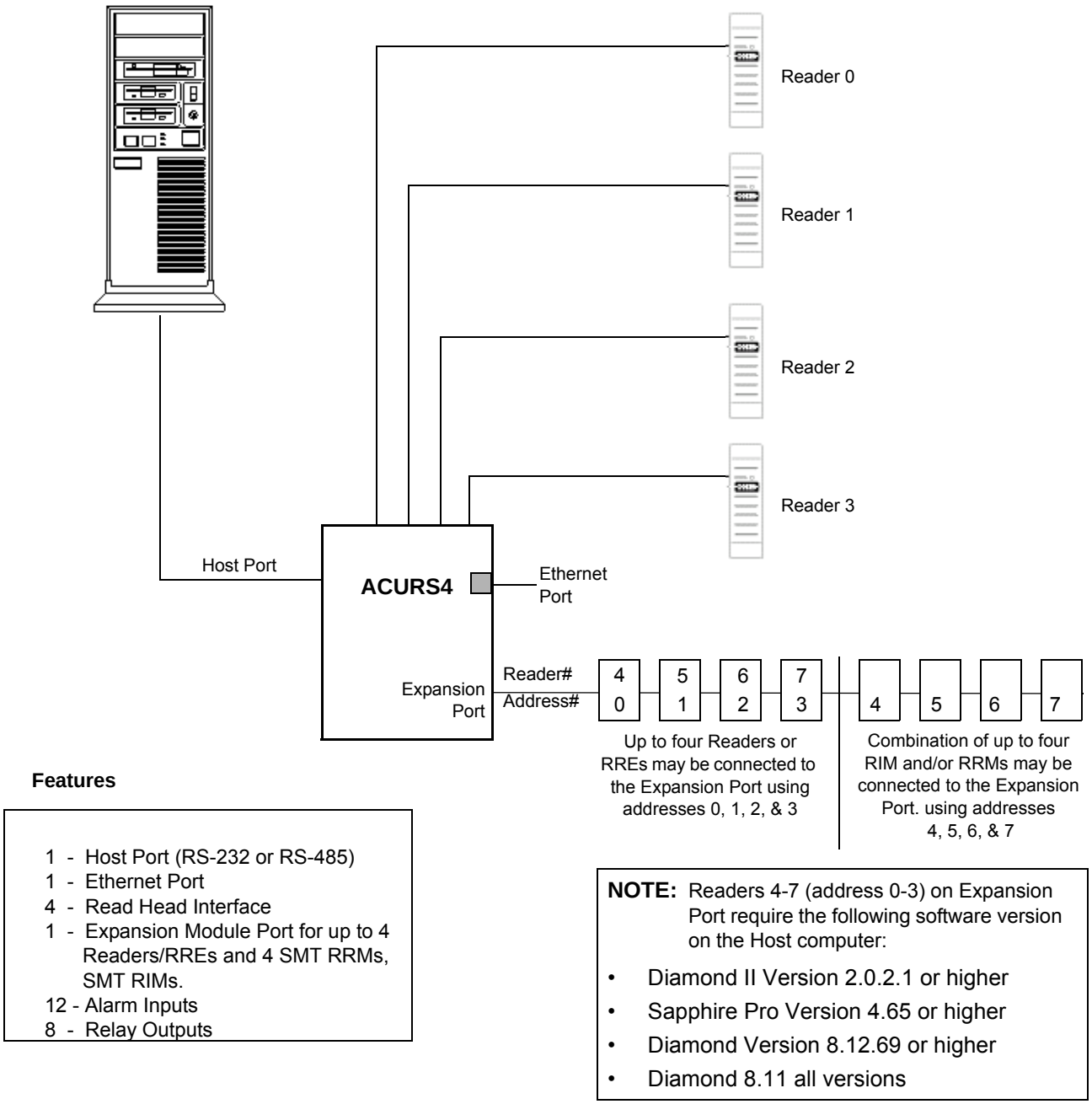

Reader 0
Reader 1
Reader 2
Reader 3
Host Port
ACURS4
Ethernet Port
Expansion Port
Reader#
Address#
4 0
5 1
6 2
7 3
4
5
6
7
Up to four Readers or RREs may be connected to the Expansion Port using addresses 0, 1, 2, & 3
Combination of up to four RIM and/or RRMs may be connected to the Expansion Port. using addresses 4, 5, 6, & 7
Features
1 - Host Port (RS-232 or RS-485)
1 - Ethernet Port
4 - Read Head Interface
1 - Expansion Module Port for up to 4 Readers/RREs and 4 SMT RRMs, SMT RIMs.
12 - Alarm Inputs
8 - Relay Outputs
NOTE: Readers 4-7 (address 0-3) on Expansion Port require the following software version on the Host computer:
• Diamond II Version 2.0.2.1 or higher
• Sapphire Pro Version 4.65 or higher
• Diamond Version 8.12.69 or higher
• Diamond 8.11 all versions

Figure 3-16: ACURS4 Block Diagram

Connections for Terminal Block 1 (ACURS2 and ACURS4)

Host Communication Port

The ACURS2 and ACURS4 installations have not been evaluated by UL. The ACURS2 and ACURS4 may not be installed if the installation is to be UL 1076 and/or UL 294 approved.

TB#	Pin#	Term. Strip ID	Description	Maximum Distance and Belden or Equivalent Cable No.
1	1	SIG GND	Host Port Signal Ground	9533-24 (3 conductor) AWG, 50 feet 9534-24 (4 conductor) AWG, 50 feet 9535-24 (5 conductor) AWG, 50 feet
1	2	TXD	Host Port RS-232 Transmit Data	
1	3	RXD	Host Port RS-232 Receive Data	
1	4	RTS	Host Port RS-232 RTS	
1	5	CTS	Host Port RS-232 CTS	
1	6	TX+	Host Port RS-485 Transmit Data (+)	9842-24 AWG 4000 feet (1220 meters) maximum
1	7	TX-	Host Port RS-485 Transmit Data (-)	
1	8	RX+	Host Port RS-485 Receive Data (+)	
1	9	RX-	Host Port RS-485 Receive Data (-)	

Table 3-20: Terminal Block TB1 Pin Number Identification

Connections for Terminal Block 2, 3, and 4 (ACURS2 and ACURS4)

Reader 0 Connections

TB#	Pin#	Term. Strip ID	Description	Maximum Distance Belden or Equivalent Cable No.
2	1	+12 VDC	Fused 12 VDC Output	See Manufactures Data
2	2	+5 VDC	Fused 5 VDC Output	
2	3	0 V	0 Volts	
2	4	DATA 0	Reader Data 0 (Green)	
2	5	DATA 1	Reader Data 1 (White)	
2	6	RED LED	Red LED	
2	7	GREEN LED	Green LED	
2	8	BUZZER	Buzzer	
3	1	Z0+	Normally Closed Door Contact	9407-22 AWG / 9409-18 AWG 1000 feet (305 meters) / 4000 feet (1220 meters)
3	2	Z0-		
3	3	Z1+	Normally Open Request-to-Exit Contact	9407-22 AWG / 9409-18 AWG 1000 feet (305 meters) / 4000 feet (1220 meters)
3	4	Z1-		
3	5	Z2+	Normally Closed Spare Input	9407-22 AWG / 9409-18 AWG 1000 feet (305 meters) / 4000 feet (1220 meters)
3	6	Z2-		
4	1	NC	Door Strike Relay Normally Closed	9409-18 AWG (See Warning)
4	2	C	Door Strike Relay Common	
4	3	NO	Door Strike Relay Normally Open	

Table 3-21: Terminal Block TB2, 3, and 4 Pin Number Identification

Warning:

DO NOT switch any voltage over 30 VDC on these relays.

Connections for Terminal Block 5, 6, and 7 (ACURS2 and ACURS4)

Reader 1 Connections

TB#	Pin#	Term. Strip ID	Description	Maximum Distance Belden or Equivalent Cable No.
5	1	+12 VDC	Fused 12 VDC Output	9514-22 AWG
5	2	+5 VDC	Fused 5 VDC Output	
5	3	0 V	0 Volts	
5	4	DATA 0	Reader Data 0 (Green)	
5	5	DATA 1	Reader Data 1 (White)	
5	6	RED LED	Red LED	
5	7	GREEN LED	Green LED	
5	8	BUZZER	Buzzer	
6	1	Z0+	Normally Closed Door Contact	9407-22 AWG at 1000 feet (305 meters) 9409-18 AWG at 4000 feet (1220 meters)
6	2	Z0-		
6	3	Z1+	Normally Open Request-to-Exit Contact	9407-22 AWG at 1000 feet (305 meters) 9409-18 AWG at 4000 feet (1220 meters)
6	4	Z1-		
6	5	Z2+	Normally Closed Spare Input	9407-22 AWG at 1000 feet (305 meters) 9409-18 AWG at 4000 feet (1220 meters)
6	6	Z2-		
7	1	NC	Door Strike Relay Normally Closed	9409-18 AWG (See Warning)
7	2	C	Door Strike Relay Common	
7	3	NO	Door Strike Relay Normally Open	

Table 3-22: Terminal Block TB5, 6, and 7 Pin Number Identification

Warning:

The plug in AC power supply can only be use to power one ACURS board.

Connections for Terminal Block 8 (ACURS2 and ACURS4)

Expansion Module Communication Port RS-485 Connections

Pin No.	Term. Strip ID	Description	Maximum Distance Belden or Equivalent Cable No.
1	SIG GND	Signal Ground	9842-24 AWG 4000 feet (1220 meters) maximum
2	TX+	Transmit +	
3	TX-	Transmit -	
4	RX+	Receive +	
5	RX-	Receive -	

Table 3-23: Terminal Block TB8 Pin Number Identification

Connections for Terminal Block 9 (ACURS2 and ACURS4)

Reader 0 and 1 Auxiliary Relay Connections

Pin No.	Term. Strip ID	Description	Maximum Distance Belden or Equivalent Cable No.
1	NC	Reader 0 Aux Relay Normally Closed	9409-18 AWG See WARNING
2	C	Reader 0 Aux Relay Common	
3	NO	Reader 0 Aux Relay Normally Open	
4	NC	Reader 1 Aux Relay Normally Closed	9409-18 AWG See WARNING
5	C	Reader 1 Aux Relay Common	
6	NO	Reader 1 Aux Relay Normally Open	

Table 3-24: Terminal Block TB9 Pin Number Identification

Warning:

DO NOT switch any voltage over 30 VDC on these relays.

Connections for Terminal Block 10 (ACURS2 and ACURS4)

Power Connections

Pin No.	Term. Strip ID	Description
1	24 VAC INPUT	24 VAC Input 40 Volt Amps (from plug in transformer)
2	24 VAC INPUT	
3	Frame Ground	Frame Ground (connected to cabinet stud)
4	0 V	Ground
5	0 V	Ground
6	Battery 24 V+	Positive Input from Power Supply or UPS Batteries
7	Battery 24 V-	Negative Input from Power Supply UPS Batteries

Table 3-25: Terminal Block TB10 Pin Number Identification

Connections for Terminal Block 11 (ACURS2 and ACURS4)

Cabinet Tamper Connections

Pin No.	Term. Strip ID	Description	Maximum Distance Belden or Equivalent Cable No.
1	ACPF	AC Power Fault Input	24 Gauge to optional UPS
2	0 V	Power Fault & Tamper Input Common	24 Gauge Common connection
3	CTSW	Cabinet Tamper Switch	24 Gauge Factory Wired

Table 3-26: Terminal Block TB11 Pin Number Identification

Warning:

The ACURS board requires 12 AV power. The plug in AC power supply can only be use to power one ACURS board.

Connections for Terminal Block 12, 13, and 14 (ACURS4 Only)

Reader 2 Connections

TB#	Pin#	Term. Strip ID	Description	Maximum Distance Belden or Equivalent Cable No.
12	1	+12 VDC	Fused 12 VDC Output	9514-22 AWG
12	2	+5 VDC	Fused 5 VDC Output	
12	3	0 V	0 Volts	
12	4	DATA 0	Reader Data 0 (Green)	
12	5	DATA 1	Reader Data 1 (White)	
12	6	RED LED	Red LED	
12	7	GREEN LED	Green LED	
12	8	BUZZER	Buzzer	
13	1	Z0+	Normally Closed Door Contact	9407-22 AWG at 1000 feet (305 meters) 9409-18 AWG at 4000 feet (1220 meters)
13	2	Z0-		
13	3	Z1+	Normally Open Request To Exit Contact	9407-22 AWG at 1000 feet (305 meters) 9409-18 AWG at 4000 feet (1220 meters)
13	4	Z1-		
13	5	Z2+	Normally Closed Spare Input	9407-22 AWG at 1000 feet (305 meters) 9409-18 AWG at 4000 feet (1220 meters)
13	6	Z2-		
14	1	NC	Door Strike Relay Normally Closed	9409-18 AWG See WARNING
14	2	C	Door Strike Relay Common	
14	3	NO	Door Strike Relay Normally Open	

Table 3-27: Terminal Block TB12, 13, and 14, Pin Number Identification

Warning:

The ACURS board requires 12 AV power. The plug in AC power supply can only be use to power one ACURS board.

Connections for Terminal Block 15, 16, and 17 (ACURS4 Only)

Reader 3 Connections

TB#	Pin#	Term. Strip ID	Description	Maximum Distance Belden or Equivalent Cable No.
15	1	+12 VDC	Fused 12 VDC Output	9514-22 AWG
15	2	+5 VDC	Fused 5 VDC Output	
15	3	0V	0 Volts	
15	4	DATA 0	Reader Data 0 (Green)	
15	5	DATA 1	Reader Data 1 (White)	
15	6	RED LED	Red LED	
15	7	GREEN LED	Green LED	
15	8	BUZZER	Buzzer	
16	1	Z0+	Normally Closed Door Contact	9407-22 AWG at 1000 feet (305 meters) 9409-18 AWG at 4000 feet (1220 meters)
16	2	Z0-		
16	3	Z1+	Normally Open Request-to-Exit Contact	9407-22 AWG at 1000 feet (305 meters) 9409-18 AWG at 4000 feet (1220 meters)
16	4	Z1-		
16	5	Z2+	Normally Closed Spare Input	9407-22 AWG at 1000 feet (305 meters) 9409-18 AWG at 4000 feet (1220 meters)
16	6	Z2-		
17	1	NC	Door Strike Relay Normally Closed	9409-18 AWG See WARNING
17	2	C	Door Strike Relay Common	
17	3	NO	Door Strike Relay Normally Open	

Table 3-28: Terminal Block TB15, 16, and 17, Pin Number Identification

Warning:

DO NOT switch any voltage over 30 VDC on these relays.

Connections for Terminal Block 18 (ACURS4 Only)

Reader 2 and 3 Auxiliary Relay Connections (ACURS4 Only)

Pin No.	Term. Strip ID	Description	Maximum Distance Belden or Equivalent Cable No.
1	NC	Reader 0 Aux Relay Normally Closed	9409-18 AWG See WARNING
2	C	Reader 0 Aux Relay Common	
3	NO	Reader 0 Aux Relay Normally Open	
4	NC	Reader 1 Aux Relay Normally Closed	9409-18 AWG See WARNING
5	C	Reader 1 Aux Relay Common	
6	NO	Reader 1 Aux Relay Normally Open	

Table 3-29: Terminal Block TB18 Pin Number Identification

Warning:
DO NOT switch any voltage over 30 VDC on these relays.

Relay Numbering for ACURS2 and ACURS4

Relay Numbers for Readers

Reader Number	ACURS2 Relay Number	ACURS4 Relay Number
Reader 0 Door Strike Relay Reader 0 Aux Relay	16 17	16 17
Reader 1 Door Strike Relay Reader 1 Aux Relay	18 19	18 19
Reader 2 Door Strike Relay Reader 2 Aux Relay	Not Available	20 21
Reader 3 Door Strike Relay Reader 3 Aux Relay	Not Available	22 23

Table 3-30: Relay Numbers for ACURS2 and ACURS4 Readers

Alarm Numbering for ACURS2 and ACURS4

Alarm Numbers for Readers

	Relays		Physical Alarm Zones			Logical Alarm Zones				
Reader Number	**Strike**	**AUX**	**Zone 0 D.C.**	**Zone 1 REX**	**Zone 2 SPARE**	**Lock Monitor**	**F.O.**	**H.O.**	**R.T.**	**OFFL**
0	16	17	16	17	18	48	64	65	66	67
1	18	19	20	21	22	50	68	69	70	71
2 *	20	21	24	25	26	52	72	73	74	75
3 *	22	23	28	29	30	54	76	77	78	79

Table 3-31: Physical to Logical Zone Numbering

Lock Monitor / Bond Sensor = If used must be connected to Z2.
F.O. = Forced Open, H.O. = Held Open, R.T. = Reader Enclosure Tamper, OFFL = Reader Off Line, D.C. = Door Contact, REX = Request to Exit.
* Readers 2, and 3 are available on ACURS4 only.

DIP switch SW1 Communication Port Termination

To be switched on to terminate communications line when panel is last on the RS-485 loop.

Switch SW1	Description
S1	ON = Host TX Line Terminated
S2	ON = Host RX Line Terminated
S3	ON = Expansion Module Port TX Line Terminated
S4	ON = Expansion Module Port RX Line Terminated

Table 3-32: Switch SW1 Settings on the ACURS2 and ACURS4

DIP Switches for ACURS2 and ACURS4

DIP Switch SW2 Settings Baud Rate, Dial-up, Parity, and Com Type

Switch SW2	Switch Setting			Function
	S1	**S2**	**S3**	**Host Communication Baud Rate**
S1 through S3	OFF	OFF	OFF	19200
	ON	OFF	OFF	38400
	OFF	ON	OFF	57600
	ON	ON	OFF	1200
	OFF	OFF	ON	115200
	ON	OFF	ON	2400
	OFF	ON	ON	4800
	ON[1]	ON[1]	ON[1]	9600
S4	OFF[1]			DES Encryption Enabled
S5	ON			Dial-Up Host Communications
	OFF[1]			Dedicated Host Communications
S6	ON			Use 5-wire RS-232 using RTS & CTS
	OFF[1]			Use RS-485 or 3-wire RS-232
S7	ON[1]			LAN and Serial port H1 dual reporting path[2]
	OFF			Spare
S8	ON			Host Communication uses No Parity (modem)
	OFF[1]			Host Communication uses Even Parity

Table 3-33: DIP Switch SW2 Settings on the ACURS2 and ACURS4 Controller

[1] Denotes default setting

[2] SW3 switch 1 must be **ON** indicating. Select the correct baud rate for your network

DIP Switch SW3 Settings

Switch SW3	Description
S1	ON = LAN Enabled
S2	ON = Allow LAN IP Parameters Update
S3	ON = Default LAN IP Parameter
S4	ON = Triple DES Encryption Enabled
S5	ON = Spare – Leave OFF
S6	ON = Magnetic Stripe Cards
S7	ON = Battery Backed Up RAM *
S8	ON = Disable Watch Dog Timer

Table 3-34: DIP Switch SW3 Settings on the ACURS2 and ACURS4 Controller

* Denotes default setting.

Switch SW4 (rotary switch) Settings ACURS Panel Addressing

Switch SW4	Description
0	ACURS field Panel # 0
1	ACURS field Panel # 1
2	ACURS field Panel # 2
3	ACURS field Panel # 3
4	ACURS field Panel # 4
5	ACURS field Panel # 5
6	ACURS field Panel # 6
7	ACURS field Panel # 7
8	ACURS field Panel # 8
9	ACURS field Panel # 9
A	ACURS field Panel # 10
B	ACURS field Panel # 11
C	ACURS field Panel # 12
D	ACURS field Panel # 13
E	ACURS field Panel # 14
F	ACURS field Panel # 15

Table 3-35: Rotary Switch SW4 Settings on the ACURS2 and ACURS4

DIP Switch SW5 and SW6 Settings Alarm Zone Termination for Readers.

Switch SW5	ON Position = Terminated – No Input Device Present OFF Position = Not Terminated – Zone In Use With End Of Line Resistor
S1	Terminates Zone Input Reader 0 Zone 0 with a 1k-ohm resistor
S2	Terminates Zone Input Reader 0 Zone 1 with a 1k-ohm resistor *
S3	Terminates Zone Input Reader 0 Zone 2 with a 1k-ohm resistor
S4	Terminates Zone Input Reader 1 Zone 0 with a 1k-ohm resistor
S5	Terminates Zone Input Reader 1 Zone 1 with a 1k-ohm resistor *
S6	Terminates Zone Input Reader 1 Zone 2 with a 1k-ohm resistor
Switch SW6	
S1	Terminates Zone Input Reader 2 Zone 0 with a 1k-ohm resistor
S2	Terminates Zone Input Reader 2 Zone 1 with a 1k-ohm resistor *
S3	Terminates Zone Input Reader 2 Zone 2 with a 1k-ohm resistor
S4	Terminates Zone Input Reader 3 Zone 0 with a 1k-ohm resistor
S5	Terminates Zone Input Reader 3 Zone 1 with a 1k-ohm resistor *
S6	Terminates Zone Input Reader 3 Zone 2 with a 1k-ohm resistor

Table 3-36: DIP Switch SW6 Settings Alarm Termination for Readers

* If exit push button is not connected, (reader zone 1), then another 1000 ohm resistor must be installed across the zone input.

DIP Switch SW7 Power Switch

Switch SW7	Description
Slide Switch	Turns on Boards Power Supply

Table 3-37: Switch SW7 Power Switch on the ACURS2 and ACURS4

Status LEDs on the ACURS2 and ACURS4

ACURS Power-Up Self-test

The ACURS2 and ACURS4 should always be tested after installing any module. The power-up self-test indicators are for both the ACURS2 and ACURS4 controller. The LEDs will light as follows: at power-up, all ON, at hardware reset, all OFF.

Status LED	Description
1	ON indicating power-up
2	ON indicating successful RAM test
3	ON indicating successful PROM test
4	ON indicating initialization complete (1 second)

Table 3-38: Power-Up LED Status

ACURS Online Status

The normal operating indicators for the ACURS controllers are indicated by LEDs 1 – 4. The LEDs on the ACURS controller's PCB will light as follows:

Status LED	Description
1	Flashes at a 1 Hz rate
2	ON while transmitting to the Remote Modules
3	Two seconds OFF, then blinks once if Reader 0 is online, followed by blinking twice if Reader 1 is online, etc.
4	ON if zone voltage reference is ever out of range (indicates board or power supply failure)

Table 3-39: ACURS Online Status LEDS

LAN LED Status

Status LED	Description
TX	ON Transmitting
RX	ON Receiving
COL	ON Collision
Link	ON Cable connected
Rev	ON Cable reversed

Table 3-40: LAN LED Status

Host Port LED Status

Status LED	Description
Transmit Data	ON transmitting data to host computer
Receive Data	ON Receiving data from host computer

Table 3-41: Host Port LED Status

Reader Zones LED Status

Status LED	Description
Reader 0-3 Zone 0,1, & 2	OFF - Secure ON - Active Alarm Fast Flashing - Trouble (open or short, etc.) Slow Flashing - Masked

Table 3-42: Reader Zone LED Status

Relay and Door Strike LED Status

Status LED	Description
All Relays	ON Relay is energized

Table 3-43: Relay and Door Strike LED Status

Clearing the Memory on the ACURS2 and ACURS4

To clear memory, first power off the ACURS2 and ACURS4. Set the *even* switches (positions 2, 4, 6, & 8) on DIP Switch SW2 to **ON** and the *odd* switches (positions 1, 3, 5, & 7) to **OFF**. Set the polling address of the Rotary Switch SW4 to **F**. Apply power to the ACURS2 or ACURS4. LEDs 1-4 will blink together indicating that the operation is complete. Turn power off and reset switches SW2 and SW4 to the desired settings.

Multi-dropping RS-485 from LAN Connected ACUs

You may still multi-drop any ACU from an ACURS2/4 connected to the LAN via RS-485 up to a maximum of 4,000 feet to the last ACU from the ACURS2/4. See the wiring diagram below and the wiring table that follows.

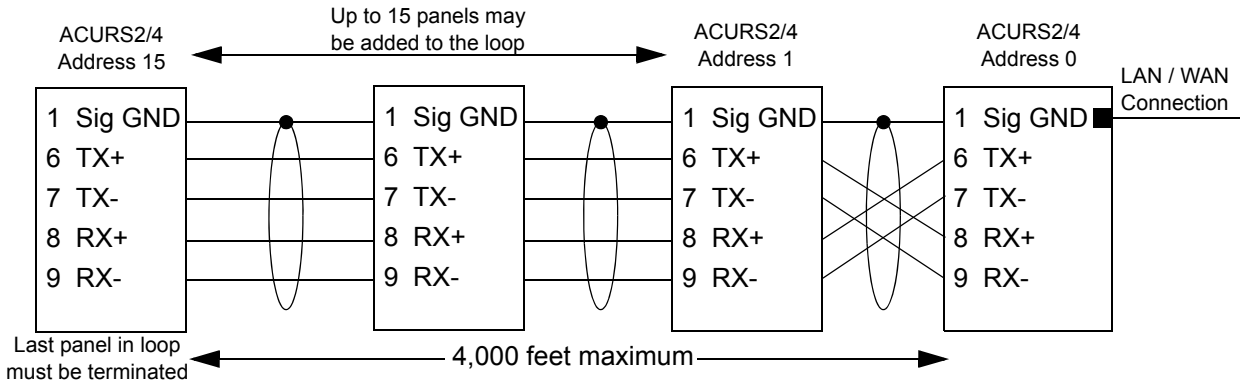


Figure 3-17: Multi-droop RS-485 Wiring From LAN Connected ACURS2 or ACURS4

NOTES:

1. SW3 DIP switch 1 must be ON to enable the LAN connection.
2. An ACUX may also be connected the to RS485 Host port. See Table 3-10 for proper TB connections.

LAN AUCRS2/4 Connector TB1	To 2nd ACURS Connector TB1	To 3rd ACURS Connector TB1	To 4th ACURS Connector TB1
1- Sig GND	1- Sig GND	1- Sig GND	1- Sig GND
8 - RX+	6 - TX+	6 - TX+	6 - TX+
9 - RX-	7 - TX-	7 - TX-	7 - TX-
6 - TX+	8 - RX+	8 - RX+	8 - RX+
7 - TX-	9 - RX-	9 - RX-	9 - RX-

Table 3-44: Multi-droop RS-485 Wiring From LAN Connected ACURS2 or ACURS4.

Installing Dial-up Modem on the ACURS2 and ACURS4

The modem board mounts on the ACURS board near the top by plugging into the J1 connector on the modem board into the PJ1 connector on the ACURS board, as shown below.

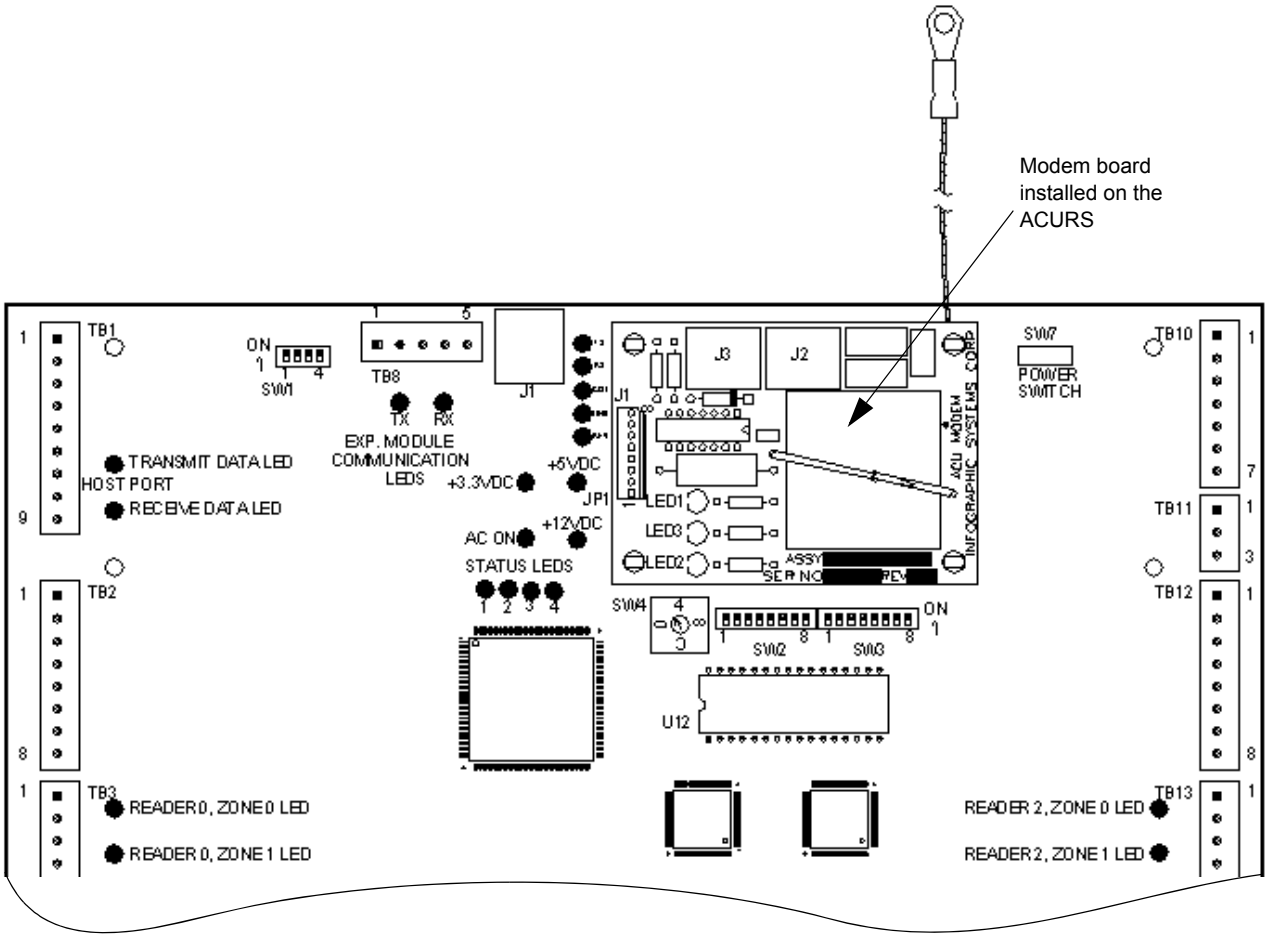


Figure 3-18: Dial-up Modem Installed on Top of the ACURS Board

Install the modem board by aligning connectors JP1 and J1 and the four (4) plastic standoffs (already installed on the modem board) with the holes on the ACURS board. While making sure that connectors J1and JP1 are lined up, gently snap the standoffs into the holes.

NOTE: When using dial-up modems the baud rates MUST be set to 9600 with no parity. Also **a US Robotics Sportster external modem (Model 0459 or 0701) must be used at the host computer**. See *Installing Server External Modem* later in this chapter for more details.

Warning:

Make certain that the AC power source circuit breaker(s) is OFF before proceeding. Failure to heed this WARNING can cause death, personal injury, or damage to unit(s).

ACU2/16 Controller Circuit Board

For the location of components discussed in this section see Figure 3-19 below.

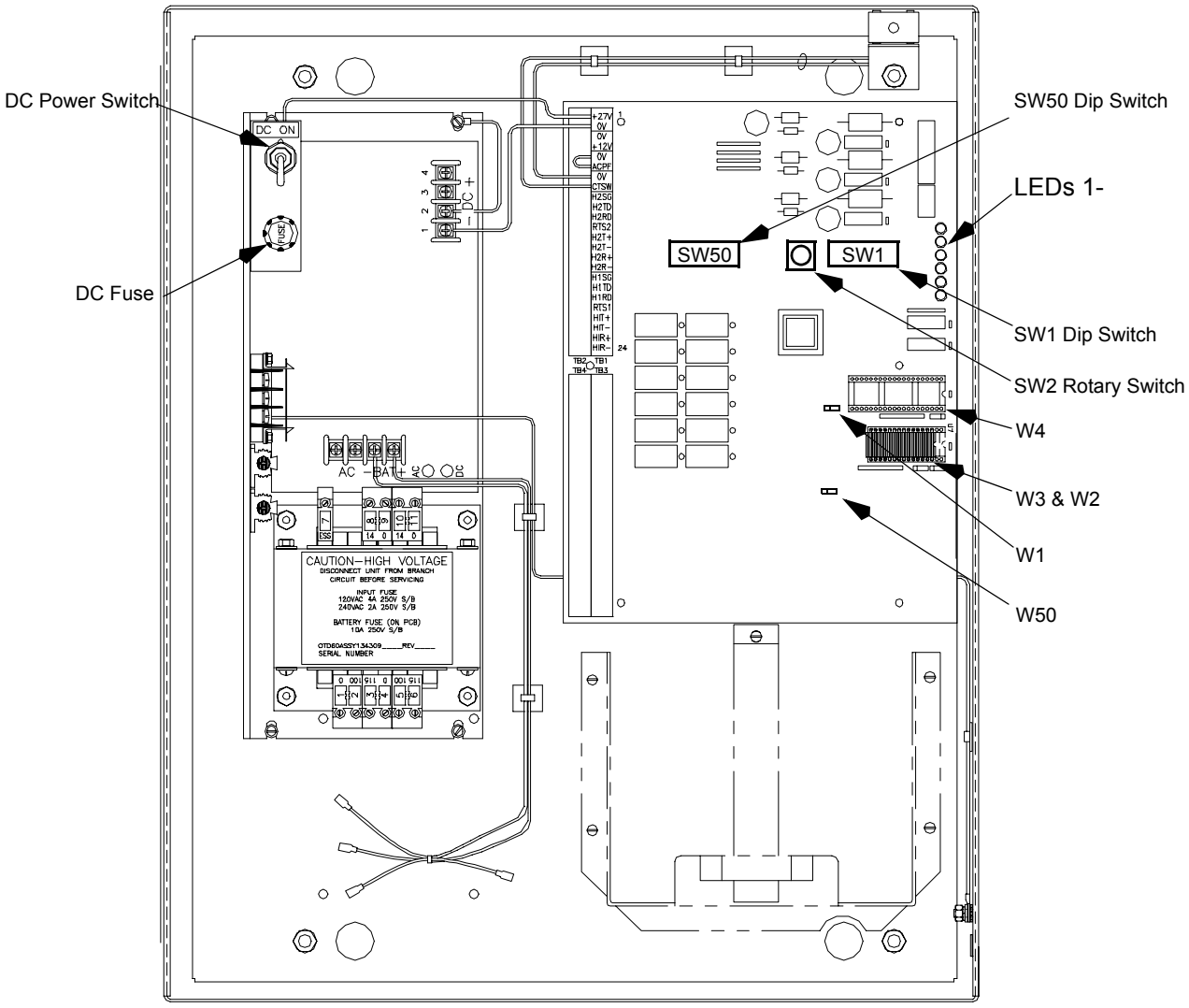


Figure 3-19: Location of Fuses, DIP Switches (SW1, SW50) and Rotary Switch (SW2) on the ACU2/16

ACUXL16 Configuration Information

The ACUXL16 offers the capability of hosting up to sixteen readers on one ACU through the use of firmware version AC01.52.00 or later.

Connection of the RRE is through two reader communication ports. Readers 0-3 and 8-11 are connected to reader port 1 and readers 4-7 and 12-15 are connected to reader port 2.

	Relays		Physical Alarm Zones				Logical Alarm Zones				
Reader Number	**Strike**	**AUX**	**Zone 0**	**Zone 1**	**Zone 2**	**Zone 3**	**Lock Monitor**	**F.O.**	**H.O.**	**R.T.**	**OFFL**
0	16	17	16	17	18	19	48	64	65	66	67
1	18	19	20	21	22	23	50	68	69	70	71
2	20	21	24	25	26	27	52	72	73	74	75
3	22	23	28	29	30	31	54	76	77	78	79
4	24	25	32	33	34	35	56	80	81	82	83
5	26	27	36	37	38	39	58	84	85	86	87
6	28	29	40	41	42	43	60	88	89	90	91
7	30	31	44	45	46	47	62	92	93	94	95
8	32	33	128	129	130	131	49	96	97	98	99
9	34	35	144	145	146	147	51	100	101	102	103
10	36	37	160	161	162	163	53	104	105	106	107
11	38	39	176	177	178	179	55	108	109	110	111
12	40	41	192	193	194	195	57	112	113	114	115
13	42	43	208	209	210	211	59	116	117	118	119
14	44	45	224	225	226	227	61	120	121	122	123
15	46	47	240	241	242	243	63	124	125	126	127

Lock Monitor / Bond Sensor = If used must be connected to Z2.
F.O. = Forced open, H.O. = Held Open, R.T. = Reader Enclosure Tamper, OFFL = Reader Off Line

Table 3-45: Relays - Physical to Logical Zone Numbering

NOTE: If the ACU is being used for Elevator Control the relay numbering will be different. See Page 10-3 for Elevator Control Relays.

The RRE-2 and RRE-4 will require replacing the standard address 0-3 PROM with a optional version for reader address 4-7. Compatible PROMs will be identified with one of the following labels:

RRE-2		RRE-4	
Base Address 0-3 (Standard PROM)	Higher Address 4-7 (Optional PROM)	Base Address 0-3 (Standard PROM)	Higher Address 4-7 (Optional PROM)
PL-135485-A 2 READER SUPPORT RRE-4 U2 ADDR 0 – 3 RRE2_BC BC01 Copyright 2000 IGYS	PL-135822-A 2 READER SUPPORT RRE-4 U2 ADDR 4 – 7 RRE2XBC C48E Copyright 2000 IGYS	PL-135354-C 4 READER SUPPORT RRE-4/ACU-R U2 ADDR 0–3 R4MW03LB 9FA5 Copyright 2000 IGYS	PL-135824-B 4 READER SUPPORT RRE-4/ACU-R U2 ADDR 4-7 R4MW47CB A726 Copyright 2000 IGYS
DIP Switch Settings* Switch 1 enables Address 0 Switch 2 enables Address 1 Switch 3 enables Address 2 Switch 4 enables Address 3	DIP Switch Settings* Switch 1 enables Address 4 Switch 2 enables Address 5 Switch 3 enables Address 6 Switch 4 enables Address 7	DIP Switch Settings Switch 1 enables Address 0 Switch 2 enables Address 1 Switch 3 enables Address 2 Switch 4 enables Address 3	DIP Switch Settings Switch 1 enables Address 4 Switch 2 enables Address 5 Switch 3 enables Address 6 Switch 4 enables Address 7

***** When setting switches on the RRE-2, addresses must remain sequential. For example, set switches 0&1, or 2&3. The board will not accept gaps in addresses such as 0&3.

Table 3-46: RRE-2 & RRE-4 DIP switch settings

InfoGraphic's single-stage readers and two-stage Remote Reader Electronics (RRE01-E1L) shipped after 10/99 are equipped with PROM allowing for all address. Current PROMs will carry the following label:

DIP Switch Settings

PL-135823-A
ACU READER U2
ARDR8Q AE1A
Copyright 2000 IGYS

Switch #	1	2	3		4	5	
	Off	Off	Off	Address 0	Off	Off	Magnetic stripe on Track 2 or 3
	On	Off	Off	Address 1	Off	On	Wiegand
	Off	On	Off	Address 2	On	Off	Magnetic Format on Wiegand Output
	On	On	Off	Address 3	On	On	Magnetic stripe on Track 1
	Off	Off	On	Address 4			
	On	Off	On	Address 5			
	Off	On	On	Address 6			
	On	On	On	Address 7			

Table 3-47: DIP Switch Settings

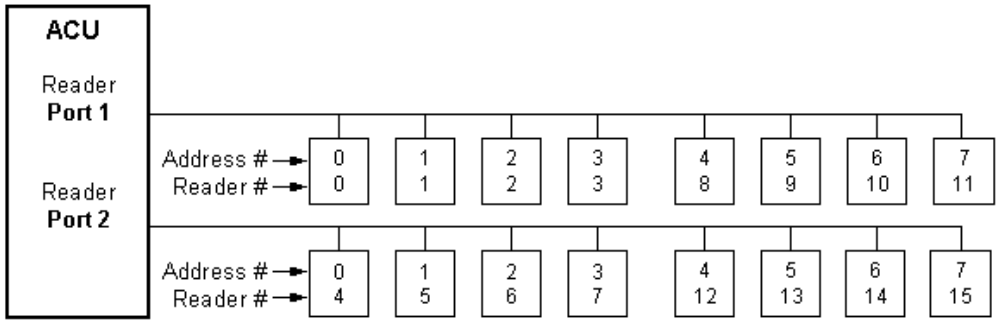


Figure 3-20: Reader addressing per port of ACU for 16 readers.

NOTE: The base address combined with the ACU Port determines the logical reader number.

Terminal Block PIN Outs on The ACUXL

Table 3-48 through Table 3-53 show cable types and connections to the ACUXL controller's terminal blocks TB1 through TB6. Explanations of the table column headings are as follows:

1	2	3	4	5
Pin No.	**Term. Strip**	**Description**	**Belden or Equivalent Cable No. Maximum Distance Connected to:**	**Cable Color (Filled in by Installer)**

1. Identifies the pin number on the applicable terminal block.
2. Is the Abbreviation on the terminal block or printed circuit board.
3. Is the description of the terminal.
4. Identifies the cable number and the maximum distance and where it is connected.

   The Installer can write the sensor or relay connected.
5. The installer writes the color code of the cable connected to terminal.

Terminal Block TB1 (Yellow) Pin Number Identification

On the ACUXL Controller's PCB Assembly

Pin No.	Term. Strip	Description	Belden or Equivalent Cable No. Maximum Distance Connected to:	Cable Color (Filled in by Installer)
1	+27V	+27.5 Power Supply/Charger	Not Applicable - Factory Wired	Violet or Red
2	0V	0 volts		Yellow or Black
3	0V	0 volts		
4	+12V	+12 Volts output (0.4 Amp max.)*		
5	0V	AC Power Fault Input Common	Not Applicable - Factory Wired	Orange
6	ACPF	AC Power Fault Input	24 Gauge	Orange
7	0V	Cabinet Tamper Switch Common	Not Applicable - Factory Wired	Orange
8	CTSW	Cabinet Tamper Switch	24 Gauge	Orange
9	H2SG	Host Port 2 Signal Ground		
10	H2TD	Host Port 2 RS-232 Transmit Data	9534-24 AWG, 50 ft.	
11	H2RD	Host Port 2 RS-232 Receive Data		
12	RTS2	Host Port 2 RS-232 RTS		
13	H2T+	Host Port 2 RS-485 Transmit Data (+)		
14	H2T-	Host Port 2 RS-485 Transmit Data (-)	9842-24 AWG	
15	H2R+	Host Port 2 RS-485 Receive Data (+)	4000 ft. (1220 m)	
16	H2R-	Host Port 2 RS-485 Receive Data (-)		
17	H1SG	Host Port 1 Signal Ground		
18	H1TD	Host Port 1 RS-232 Transmit Data	9534-24 AWG, 50 ft.	
19	H1RD	Host Port 1 RS-232 Receive Data		
20	RTS1	Host Port 1 RS-232 RTS		
21	H1T+	Host Port 1 RS-485 Transmit Data (+)		
22	H1T-	Host Port 1 RS-485 Transmit Data (-)	9842-24 AWG	
23	H1R+	Host Port 1 RS-48-5 Receive Data (+)	4000 ft. (1220 m)	
24	H1R-	Host Port 1 RS-485 Receive Data (-)		

Table 3-48: ACU2 TB1 Connections

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* See UL Specification's Section for additional information.

Terminal Block TB2 (Red) Pin Number Identification

On the ACUXL Controller's PCB Assembly

Pin No.	Term. Strip	Description	Belden or Equivalent Cable No. Maximum Distance Connected to:	Cable Color (Filled in by Installer)
1	+24V	Reader Port 2 Voltage Out		
2	0V	Reader Port 2 Ground		
3	R2T+	Reader Port 2 Transmit Data (+)	9842-24 AWG	
4	R2T-	Reader Port 2 Transmit Data (-)	4000 ft. (1220 m)	
5	R2R+	Reader Port 2 Receive Data (+)		
6	R2R-	Reader Port 2 Receive Data (-)		
7	+24V	Reader Port 1 Voltage Out		
8	0V	Reader Port 1 Ground		
9	R1T+	Reader Port 1 Transmit Data (+)	9842-24 AWG	
10	R1T-	Reader Port 1 Transmit Data (-)	4000 ft. (1220 m)	
11	R1R+	Reader Port 1 Receive Data (+)		
12	R1R-	Reader Port 1 Receive Data (-)		
13	R11NC	Relay 11 Normally Closed	9409-18 AWG, 1000 ft. (305 m)	
14	R11C	Relay 11 Common		
15	R11NO	Relay 11 Normally Open		
16	R10NC	Relay 10 Normally Closed	9409-18 AWG, 1000 ft. (305 m)	
17	R10C	Relay 10 Common		
18	R10NO	Relay 10 Normally Open		
19	R09NC	Relay 9 Normally Closed	9409-18 AWG, 1000 ft. (305 m)	
20	R09C	Relay 9 Common		
21	R09NO	Relay 9 Normally Open		
22	R08NC	Relay 8 Normally Closed	9409-18 AWG, 1000 ft. (305 m)	
23	R08C	Relay 8 Common		
24	R08NO	Relay 8 Normally Open		

Table 3-49: ACU2 TB2 Connections

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Terminal Block TB3 (Green) Pin Number Identification

On the ACUXL Controller's PCB Assembly

Pin No.	Term. Strip	Description	Belden or Equivalent Cable No. Maximum Distance Connected to:	Cable Color (Filled in by Installer)
1	R03NC	Relay 3 Normally Closed	9409-18 AWG, 1000 ft. (305 m)	
2	R03C	Relay 3 Common		
3	R03NO	Relay 3 Normally Open		
4	R02NC	Relay 2 Normally Closed	9409-18 AWG, 1000 ft. (305 m)	
5	R02C	Relay 2 Common		
6	R02NO	Relay 2 Normally Open		
7	R01NC	Relay 1 Normally Closed	9409-18 AWG, 1000 ft. (305 m)	
8	R01C	Relay 1 Common		
9	R01NO	Relay 1 Normally Open		
10	R00NC	Relay 0 Normally Closed	9409-18 AWG, 1000 ft. (305 m)	
11	R00C	Relay 0 Common		
12	R00NO	Relay 0 Normally Open		
13	Z05+	Supervised Zone 5	9407-22 AWG, 1000 ft. (305M)	
14	Z05-	Supervised Zone 5		
15	Z04+	Supervised Zone 4	9407-22 AWG, 1000 ft. (305M)	
16	Z04-	Supervised Zone 4		
17	Z03+	Supervised Zone 3	9407-22 AWG, 1000 ft. (305M)	
18	Z03-	Supervised Zone 3		
19	Z02+	Supervised Zone 2	9407-22 AWG, 1000 ft. (305M)	
20	Z02-	Supervised Zone 2		
21	Z01+	Supervised Zone 1	9407-22 AWG, 1000 ft. (305M)	
22	Z01-	Supervised Zone 1		
23	Z00+	Supervised Zone 0	9407-22 AWG, 1000 ft. (305M)	
24	Z00-	Supervised Zone 0		

Table 3-50: ACU2 TB3 Connections

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Terminal Block TB4 (Blue) Pin Number Identification

On the ACUXL Controller's PCB Assembly

Pin No.	Term. Strip	Description	Belden or Equivalent Cable No. Maximum Distance Connected to:	Cable Color (Filled in by Installer)
1	R07NC	Relay 7 Normally Closed	9409-18 AWG, 1000 ft. (305 m)	
2	R07C	Relay 7 Common		
3	R07NO	Relay 7 Normally Open		
4	R06NC	Relay 6 Normally Closed	9409-18 AWG, 1000 ft. (305 m)	
5	R06C	Relay 6 Common		
6	R06NO	Relay 6 Normally Open		
7	R05NC	Relay 5 Normally Closed	9409-18 AWG, 1000 ft. (305 m)	
8	R05C	Relay 5 Common		
9	R05NO	Relay 5 Normally Open		
10	R04NC	Relay 4 Normally Closed	9409-18 AWG, 1000 ft. (305 m)	
11	R04C	Relay 4 Common		
12	R04NO	Relay 4 Normally Open		
13	Z11+	Supervised Zone 11	9407-22 AWG, 1000 ft. (305M)	
14	Z11-	Supervised Zone 11		
15	Z10+	Supervised Zone 10	9407-22 AWG, 1000 ft. (305M)	
16	Z10-	Supervised Zone 10		
17	Z09+	Supervised Zone 9	9407-22 AWG, 1000 ft. (305M)	
18	Z09-	Supervised Zone 9		
19	Z08+	Supervised Zone 8	9407-22 AWG, 1000 ft. (305M)	
20	Z08-	Supervised Zone 8		
21	Z07+	Supervised Zone 7	9407-22 AWG, 1000 ft. (305M)	
22	Z07-	Supervised Zone 7		
23	Z06+	Supervised Zone 6	9407-22 AWG, 1000 ft. (305M)	
24	Z06-	Supervised Zone 6		

Table 3-51: ACU2 TB4 Connections

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Terminal Block TB5 Pin Number Identification

On the ACUXL Controller's PCB Assembly

Pin No.	Term. Strip	Description	Belden or Equivalent Cable No. Maximum Distance Connected to:	Cable Color (Filled in by Installer)
6	+24	Fused 24 volt output @ 2.5 Amps		
5	0V	Ground		
4	+5V	+5 Volt output (0.25 Amp max.)		
3	+12V	+12 Volt output (0.25 Amp max.)*		
2	-12V	-12 volt output (0.25 Amp max.)		
1	0V	Ground		

Table 3-52: ACU2 TB5 Connections

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* See UL Specification's Section for additional information.

Terminal Block TB6 Pin Number Identification (ACU2 only)

Pin No.	Term. Strip	Description	Connected to: (Filled in by Installer)	Cable Color (Filled in by Installer)
1	0V	Ground		
2	+6V	Backup Battery +6 V Input	DO NOT CONNECT AT THIS TIME!!!	
3	0V	Ground		

Table 3-53: ACU2 TB6 Connections (ACU2 only)

ACUR2 and ACUR4 Controllers

Circuit Board Layout

For the location of components discussed in this section see Figure 3-21 below.

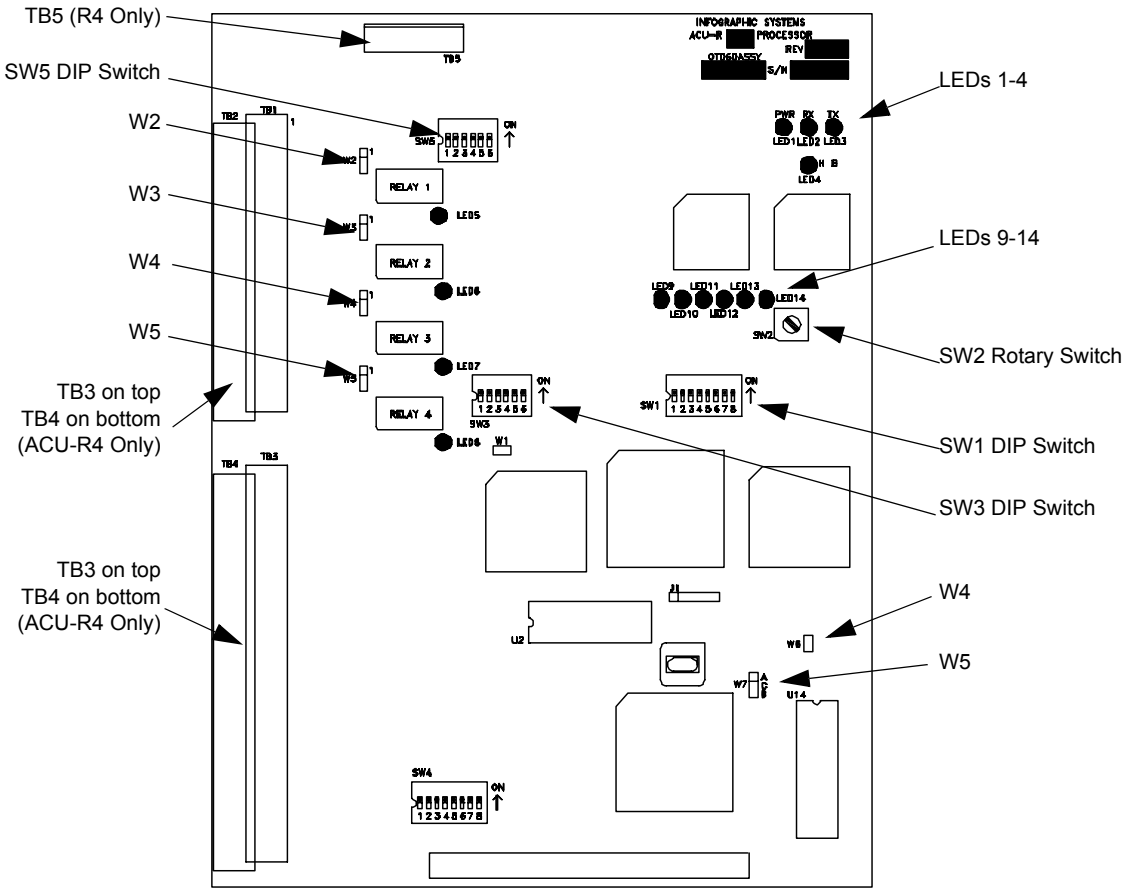

Figure 3-21: Location of Fuses, DIP Switches (SW1, SW50) and Rotary Switch (SW2) on the ACU2

ACU-R2 Block Diagram

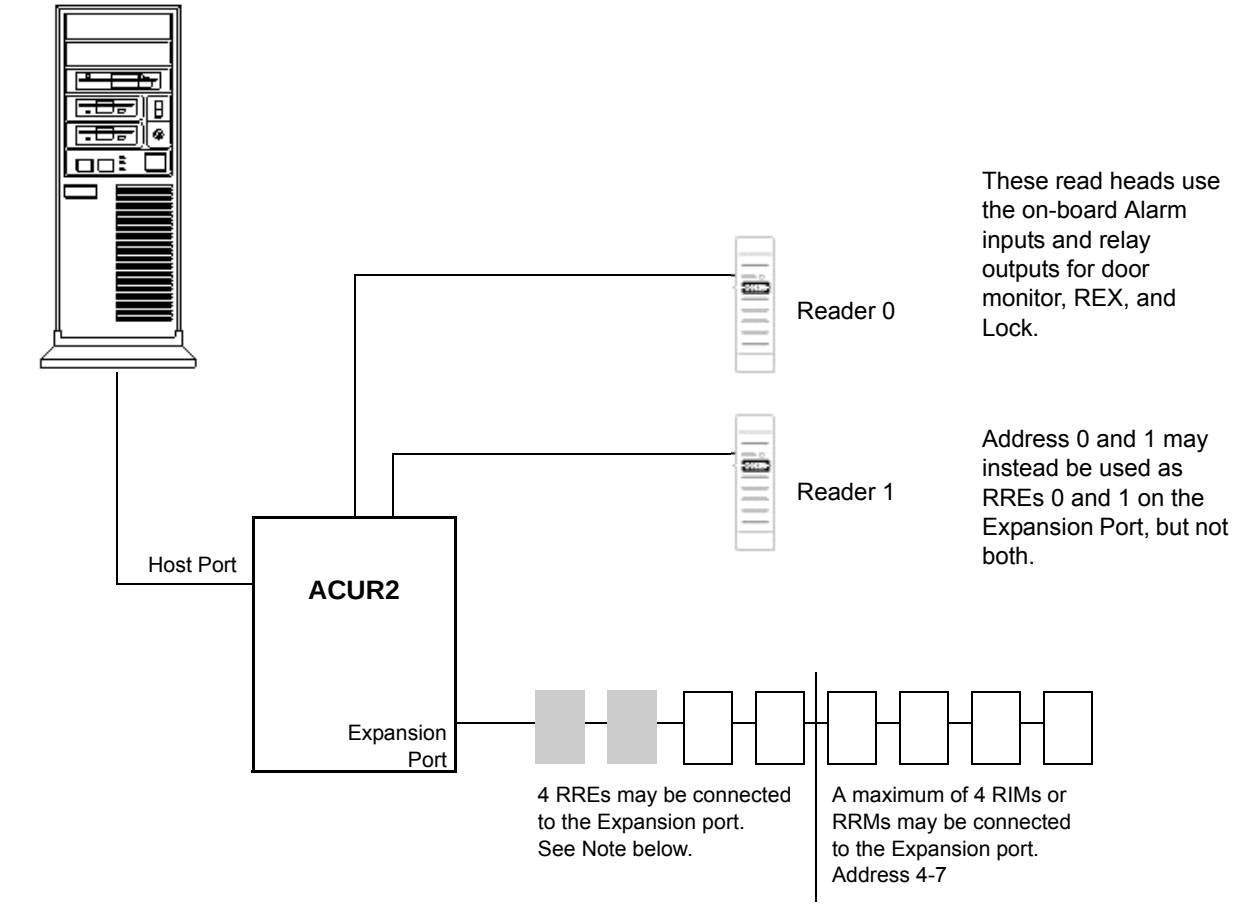
Reader 0
These read heads use the on-board Alarm inputs and relay outputs for door monitor, REX, and Lock.
Reader 1
Address 0 and 1 may instead be used as RREs 0 and 1 on the Expansion Port, but not both.
Host Port
ACUR2
Expansion Port
4 RREs may be connected to the Expansion port. See Note below.
A maximum of 4 RIMs or RRMs may be connected to the Expansion port. Address 4-7
Features
1 - Host Port (RS-232 or RS-485)
2 - Read Head Support
1 - Expansion Module Port for up to 4 SMT RRMs or SMT RIMs and 2 Readers
4 - Alarm Inputs
4 - Relay Outputs
NOTE: RRE 0-1 can be used in place of read heads 0-1 above that are directly connected to the ACU-R2.

Figure 3-22: ACU-R2 Block diagram

NOTE: Numbers in boxes represent the polling address. See DIP Switch tables for more information.

ACU-R4 Block Diagram

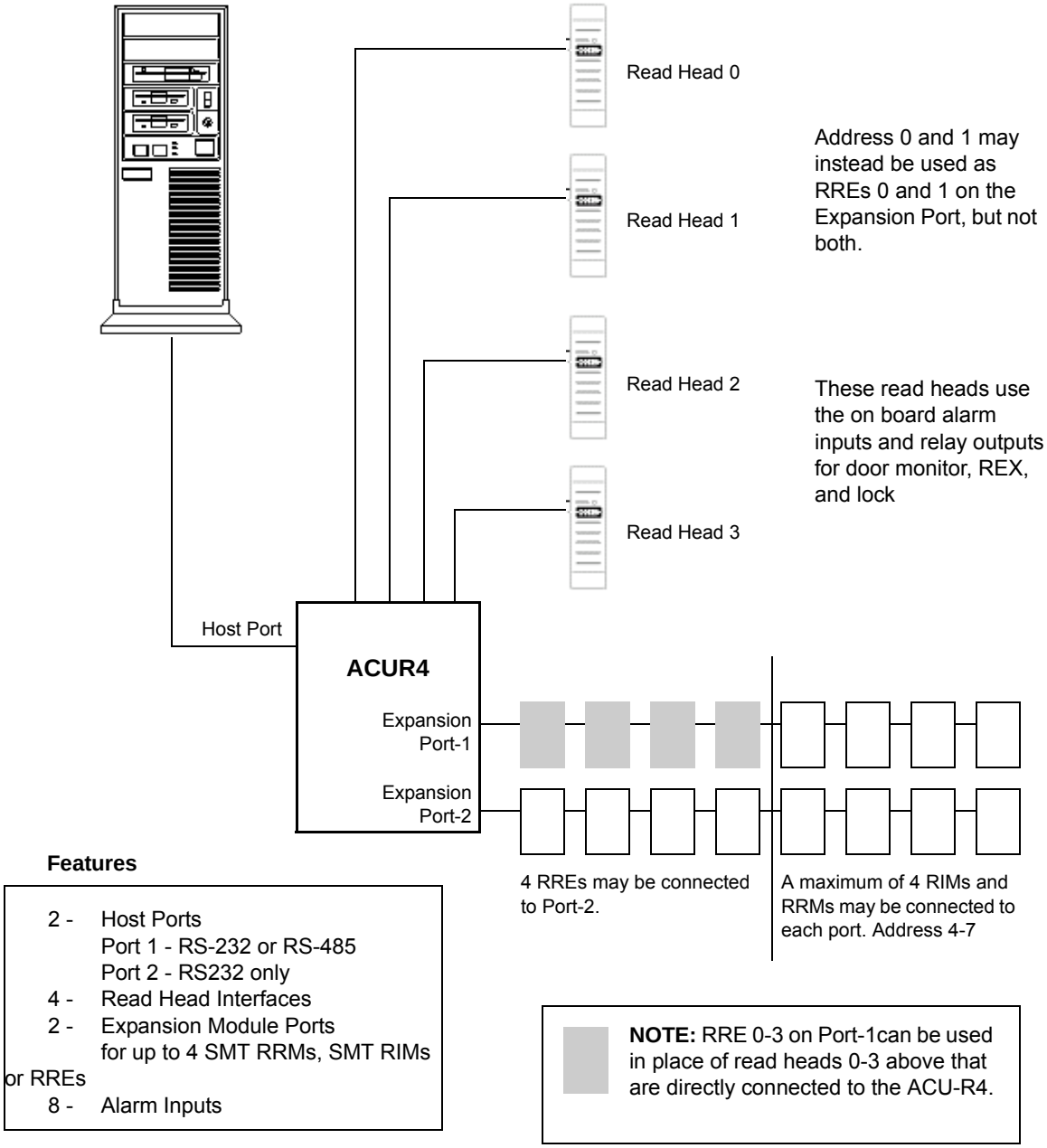
Read Head 0
Read Head 1
Read Head 2
Read Head 3
Address 0 and 1 may instead be used as RREs 0 and 1 on the Expansion Port, but not both.
These read heads use the on board alarm inputs and relay outputs for door monitor, REX, and lock
Host Port
ACUR4
Expansion Port-1
Expansion Port-2
4 RREs may be connected to Port-2.
A maximum of 4 RIMs and RRMs may be connected to each port. Address 4-7
Features
2 - Host Ports
Port 1 - RS-232 or RS-485
Port 2 - RS232 only
4 - Read Head Interfaces
2 - Expansion Module Ports
for up to 4 SMT RRMs, SMT RIMs or RREs
8 - Alarm Inputs
NOTE: RRE 0-3 on Port-1can be used in place of read heads 0-3 above that are directly connected to the ACU-R4.

Figure 3-23: ACU-R4 Block diagram

NOTE: Numbers in boxes represent the polling address. See DIP Switch tables for more information.

Dial-Up Modem ACU-PAK-D1 for ACU

Installing and Connecting

This section contains instructions on installing and wiring the ACU Dial-Up Modem. Dial-Up Modem installations have not been evaluated by UL. The modem may not be installed within the ACU enclosure if the installation is to be UL 1076 and/or UL 294 approved.

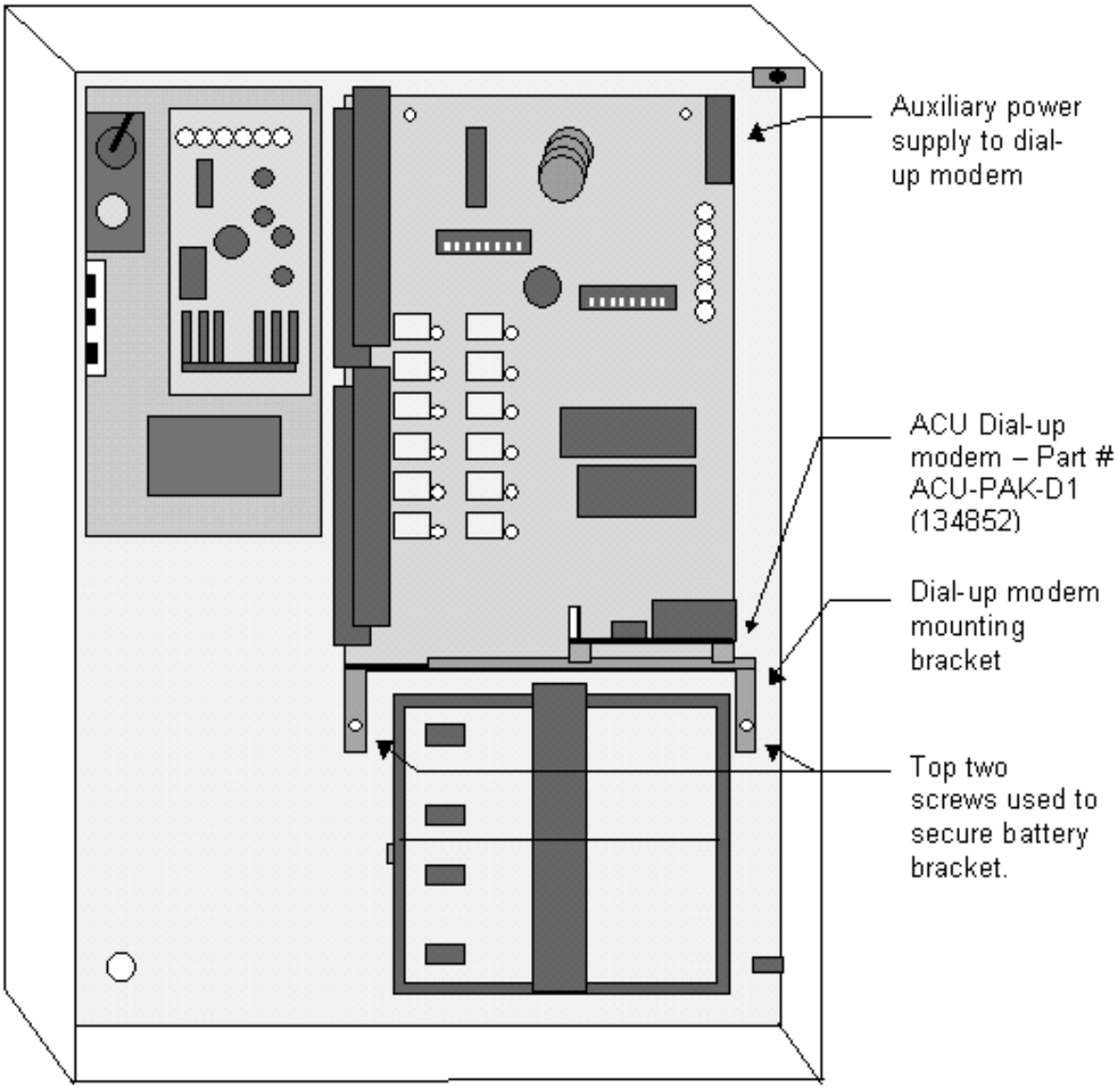
Auxiliary power supply to dial-up modem
ACU Dial-up modem – Part # ACU-PAK-D1 (134852)
Dial-up modem mounting bracket
Top two screws used to secure battery bracket.

Figure 3-24: Dial-Up Modem Mounting Kit Installed Inside the ACU Controller Enclosure
(4 Amp power supply with optional battery backup shown)

NOTE: For Dial up communications to the ACU panels, a US Robotics Sportster external modem must be used at the server.

The Dial-up modem installation and wiring connection in the ACU Controller Enclosure is made as follows.

NOTE: A battery backup or UPS is highly recommended for any ACU Device using Dial-up.

Warning:

Make certain that the AC power source circuit breaker(s) is OFF before proceeding. Failure to heed this WARNING: can cause death, personal injury or damage to unit(s).

1. Remove the screws from the upper left and upper right battery bracket.
2. Carefully slide the dial-up modem bracket into place. See Figure 3-25 and Figure 3-26.
3. Replace and tighten screws on the upper left and upper right of the battery bracket, securing the modem bracket.
4. Connect the “J1” cable to the modem as indicated in Table 3-54 if connecting to an ACU2 or Table 3-55 if connecting to an ACU-R2/R4.
5. Connect a phone line from a RJ-11 POTS line to either telephone connector on the ACU Dial-up modem.

NOTE: Phone lines used for Dial-up should be dedicated analog lines and not routed through a PBX or multiplexer

6. **SW1** on the ACU2 should be set as follows: **1,2,3, 5,** and **8** set to “**ON**”.

NOTE: The systems administrator will need to know the ACU Controller’s Serial Number. The serial number is located on top of the ACU controller board

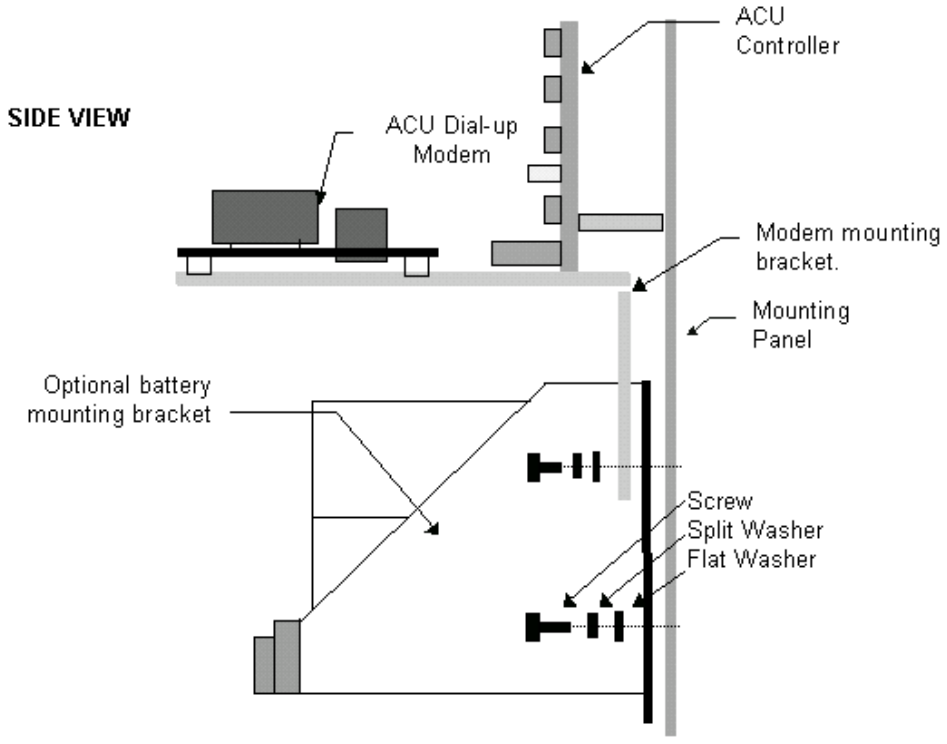

Figure 3-25: Dial-Up Modem Bracket.

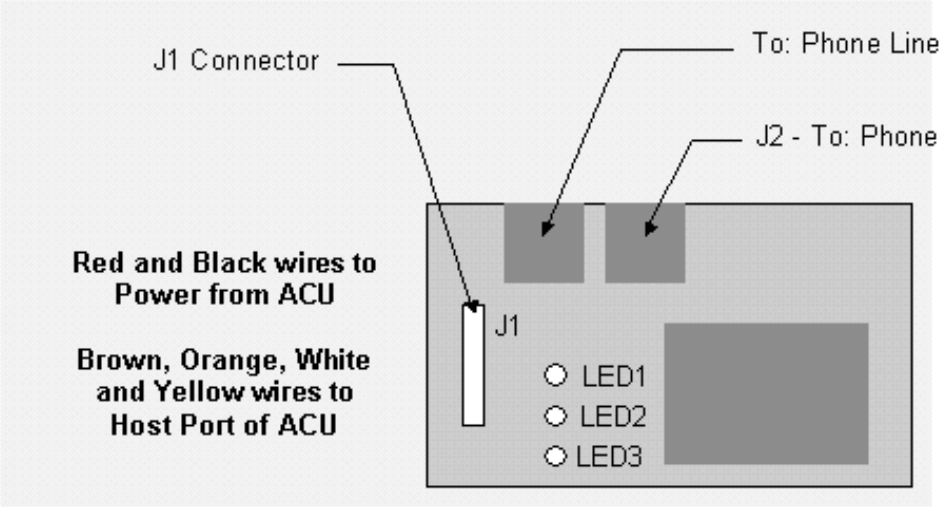

Figure 3-26: Detailed drawing of the Dial-Up Modem ACU-PAK-D1.

NOTE: See Table 3-54 or Table 3-55 for proper wiring.

ACU2 Only

Color:	Connect To:	Description
Red pair	ACU2 TB5 - 4	+5V
Black pair	ACU2 TB5 - 5	0V
Brown	ACU2 TB1 - 24	H1R-
Orange	ACU2 TB1 - 23	H1R+
White	ACU2 TB1 - 22	H1T-
Yellow	ACU2 TB1 - 21	H1T+

Table 3-54: ACU Dial-Up Modem Cable connections.

ACU-R2/R4

Color:	Connect To:	Description
Red pair	ACU TB3 – 12	+5V
Black pair	ACU TB3 – 11	0V
Brown	ACU TB1 – 14	H1R-
Orange	ACU TB1 – 13	H1R+
White	ACU TB1 – 12	H1T-
Yellow	ACU TB1 - 11	H1T+

Table 3-55: ACU Dial-up Modem Cable connections.

LED's on Modem	Description
LED1	Power - Lights when modem is "powered".
LED2	Ring Detect - Lights when the Modem has called.
LED3	Carrier Detect - Lights when the Modem has established communication with the Host modem.

Table 3-56: Dial-up Modem LED indicators.

Terminal Block PIN Outs on The ACU-R2 and R4

Connections for Terminal Block 1 (ACU-R2 and R4)

Pin No.	Term. Strip	Description	Belden or Equivalent Cable No. Maximum Distance Connected to:	Cable Color (Filled in by Installer)
1	+27V	+27.5 Power Supply/Charger	Not Applicable - Factory Wired	Violet or Red
2	0V	0 volts		Yellow or Black
3	ACPF	AC Power Fault Input	24 Gauge	Orange
4	0V	Power Fault & Tamper Input	Not Applicable - Factory Wired	Orange
5	CTSW	Cabinet Tamper Switch	24 Gauge	Orange
6	H1SG	Host Port 1 Signal Ground		
7	H1TD	Host Port 1 RS-232 Transmit Data	9534-24 AWG, 50 ft.	
8	H1RD	Host Port 1 RS-232 Receive Data		
9	H1RTS	Host Port 1 RS-232 RTS		
10	H1CTS	Host Port 1 RS-232 CTS		
11	H1T+	Host Port 1 RS-485 Transmit Data (+)		
12	H1T-	Host Port 1 RS-485 Transmit Data (-)	9842-24 AWG	
13	H1R+	Host Port 1 RS-48-5 Receive Data (+)	4000 ft. (1220 m)	
14	H1R-	Host Port 1 RS-485 Receive Data (-)		
*15	H2SG	Host Port 2 Signal Ground		
*16	H2TD	Host Port 2 RS-232 Transmit Data	9534-24 AWG, 50 ft.	
*17	H2RD	Host Port 2 RS-232 Receive Data		
*18	H2RTS	Host Port 2 RS-232 RTS		

Table 3-57: Terminal Block TB1 (Yellow) Pin Number Identification

* Not available on the ACU-R2 (Terminals are present but not active)

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Connections for Terminal Block 2 (ACU-R2 and R4)

Pin No.	Term. Strip	Description	Belden or Equivalent Cable No. Maximum Distance Connected to:	Cable Color (Filled in by Installer)
1	+24V	Fused 24 VDC Output	9842-24 AWG 4000 ft. (1220 m)	
2	0V	Reader Ground		
3	R1T+	Reader Port 1 Transmit Data (+)		
4	R1T-	Reader Port 1 Transmit Data (-)		
5	R1R+	Reader Port 1 Receive Data (+)		
6	R1R-	Reader Port 1 Receive Data (-)		
7	K0NC	Relay 0 Normally Closed	9409-18 AWG 1000 ft. (305 m)	
8	K0C	Relay 0 Common		
9	K0NO	Relay 0 Normally Open		
10	K1NC	Relay 1 Normally Closed	9409-18 AWG 1000 ft. (305 m)	
11	K1C	Relay 1 Common		
12	K1NO	Relay 1 Normally Open		
13	K2NC	Relay 2 Normally Closed	9409-18 AWG 1000 ft. (305 m)	
14	K2C	Relay 2 Common		
15	K2NO	Relay 2 Normally Open		
16	K3NC	Relay 3 Normally Closed	9409-18 AWG 1000 ft. (305 m)	
17	K3C	Relay 3 Common		
18	K3NO	Relay 3 Normally Open		

Table 3-58: Terminal Block TB2 (Red) Pin Number Identification

Warning:

DO NOT switch any voltage over 30 VDC on these relays.

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Connections for Terminal Block 3 (ACU-R2 and ACU-R4)

Pin No.	Term. Strip	Description	Connected to: (Filled in by Installer)	Cable Color (Filled in by Installer)
1	R0D0	Reader 0 Data 0	*	
2	R0D1	Reader 0 Data 1	*	
3	R0BZ	Reader 0 Buzzer (active low)	*	
4	R0RD	Reader 0 Red LED (active low)	*	
5	R0YL	Reader 0 Yellow LED (active low)	*	
6	R0GN	Reader 0 Green LED (active low)	*	
7	R0Z0+	Reader 0 Zone Input 0 (+)	Door Contact	
8	R0Z0-	Reader 0 Zone Input 0 (-)	Door Contact	
9	R0Z1+	Reader 0 Zone Input 1 (+)	Exit Push Button	
10	R0Z1-	Reader 0 Zone Input 1 (-)	Exit Push Button	
11	0V	Ground	*	
12	+5V	+5 Volt output, see note below.	*	
13	12V	+12 VDC 0.4 A max.	*	
14	0V	Ground	*	
15	R1D0	Reader 1 Data 0	*	
16	R1D1	Reader 1 Data 1	*	
17	R1BZ	Reader 1 Buzzer (active low)		
18	R1RD	Reader 1 Red LED (active low)		
19	R1YL	Reader 1 Yellow LED (active low)		
20	R1GN	Reader 1 Green LED (active low)		
21	R1Z0+	Reader 1 Zone Input 0 (+)	Door Contact	
22	R1Z0-	Reader 1 Zone Input 0 (-)	Door Contact	
23	R1Z1+	Reader 1 Zone Input 1 (+)	Exit Push Button	
24	R1Z1-	Reader 1 Zone Input 1 (-)	Exit Push Button	

Table 3-59: Terminal Block TB3 (Green) Pin Number Identification

NOTE: +5 VDC output is rated at 1.0 amps maximum (divided between both TB3 and TB4).

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* See read head manufacture data.

Connections for Terminal Block 4 (ACU-R4 only)

Pin No.	Term. Strip	Description	Connected to: (Filled in by Installer)	Cable Color (Filled in by Installer)
1	R2D0	Reader 2 Data 0	*	
2	R2D1	Reader 2 Data 1	*	
3	R2BZ	Reader 2 Buzzer (active low)	*	
4	R2RD	Reader 2 Red LED (active low)	*	
5	R2YL	Reader 2 Yellow LED (active low)	*	
6	R2GN	Reader 2 Green LED (active low)	*	
7	R2Z0+	Reader 2 Zone Input 0 (+)	Door Contact 9407-22 AWG	
8	R2Z0-	Reader 2 Zone Input 0 (-)		
9	R2Z1+	Reader 2 Zone Input 1 (+)	Exit Push Button 9407-22 AWG	
10	R2Z1-	Reader 2 Zone Input 1 (-)		
11	0V	Ground	*	
12	+5V	+5 Volt output, see note below.	*	
13	12V	+12 VDC 0.4 A max.	*	
14	0V	Ground	*	
15	R3D0	Reader 3 Data 0	*	
16	R3D1	Reader 3 Data 1	*	
17	R3BZ	Reader 3 Buzzer (active low)	*	
18	R3RD	Reader 3 Red LED (active low)	*	
19	R3YL	Reader 3 Yellow LED (active low)	*	
20	R3GN	Reader 3 Green LED (active low)	*	
21	R3Z0+	Reader 3 Zone Input 0 (+)	Door Contact 9407-22 AWG	
22	R3Z0-	Reader 3 Zone Input 0 (-)		
23	R3Z1+	Reader 3 Zone Input 1 (+)	Exit Push Button 9407-22 AWG	
24	R3Z1-	Reader 3 Zone Input 1 (-)		

Table 3-60: Terminal Block TB4 (Blue) Pin Number Identification

NOTE: +5 VDC output is rated at 1.0 amps maximum (divided between both TB3 and TB4).

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* See read head manufacture data.

Connections for Terminal Block 5 (ACU-R4 only)

Pin No.	Term. Strip	Description	Connected to: (Filled in by Installer)	Cable Color (Filled in by Installer)
1	+24	Fused 24 VDC output		
2	0V	Ground		
3	R2T+	Reader Port 2 Transmit Data (+)	9842-24 AWG	
3	R2T-	Reader 2 Port Transmit Data (-)	4000 ft. (1220 m)	
5	R2R+	Reader 2 Port Receive Data (+)		
6	R2R-	Reader Port 2 Receive Data (-)		

Table 3-61: Terminal Block TB5 Pin Number Identification

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ACU-LAN Kit (Serial Server), Optional

Installing and Connecting

The ACU-LAN Adapter allows the ACU to communicate over an existing 10BaseT or 10/100BaseT Network. With host software version 8.11.30 or higher, a serial server (ACU-LAN-KIT) *is not required at the host computer*. The ACU-LAN Adapter uses UDP, which is a subset of the TCP/IP protocol.

Like any network device, contact the network administrator to obtain a TCP/IP address for the ACU-LAN adapter and IP address of the router if required.

The ACU-LAN kit installation and wiring connections are contained in this section. The ACU-LAN installations have not been evaluated by UL. The LAN Adapter may not be installed within the ACU enclosure if the installation is to be UL 1076 and/or UL 294 approved.

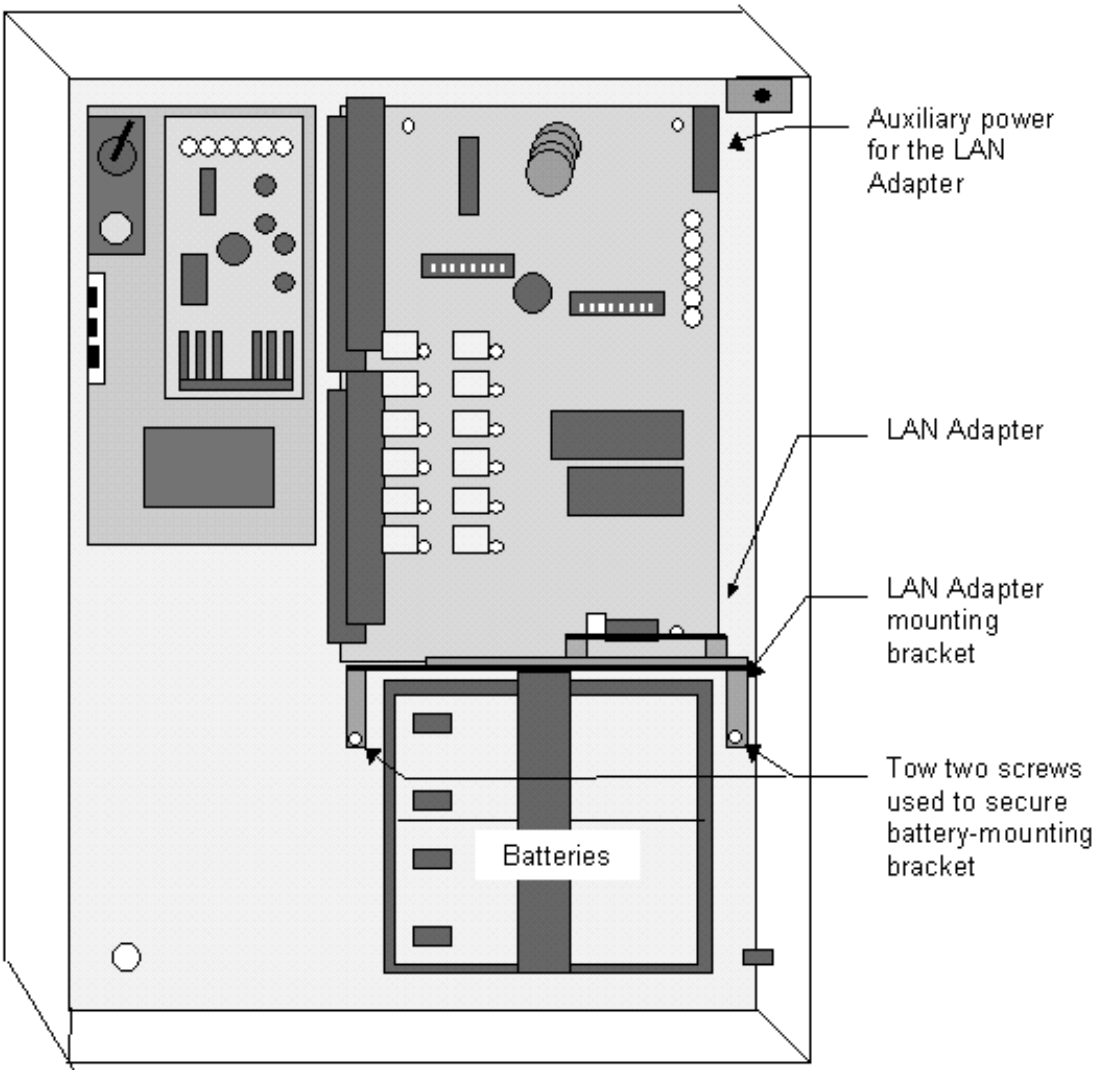
Auxiliary power for the LAN Adapter
LAN Adapter
LAN Adapter mounting bracket
Tow two screws used to secure battery-mounting bracket
Batteries

Figure 3-27: ACU-LAN Adapter Mounting Kit Installed Inside the ACU Controller Enclosure
(4 Amp power supply with optional battery backup shown)

The ACU-LAN installation and wiring connection in the ACU Controller Enclosure is made as follows.

NOTE: An UPS or Battery backup is highly recommended for any ACU Device.

Warning:

Make certain that the AC power source circuit breaker(s) is OFF before proceeding. Failure to heed this WARNING: can cause death, personal injury or damage to unit(s).

1. Remove the screws from the upper left and upper right battery bracket.
2. Carefully slide the ACU-LAN adapter bracket into place. See Figure Figure 3-28 and Figure 3-29.
3. Replace and tighten screws on the upper left and upper right of the battery bracket, securing the modem bracket.
4. Connect the cables on the ACU-LAN Adapter as indicated in Table Table 3-62 if connecting to an ACU2 or Table 3-63 if connecting to an ACU-R2/R4.
5. Connect the Network Cable.
6. Switch **SW1** on the ACU should be set as follows: **1,2, 3,** and **8** set to "**ON**" position.

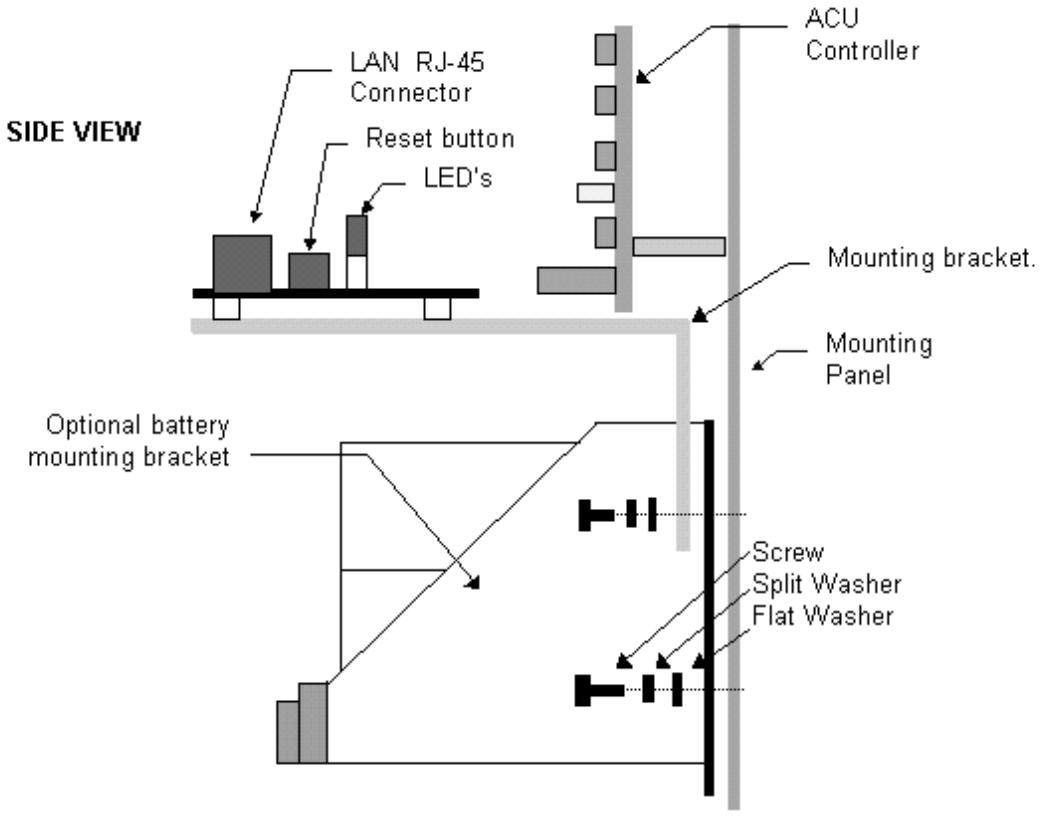

Figure 3-28: ACU-LAN Bracket.

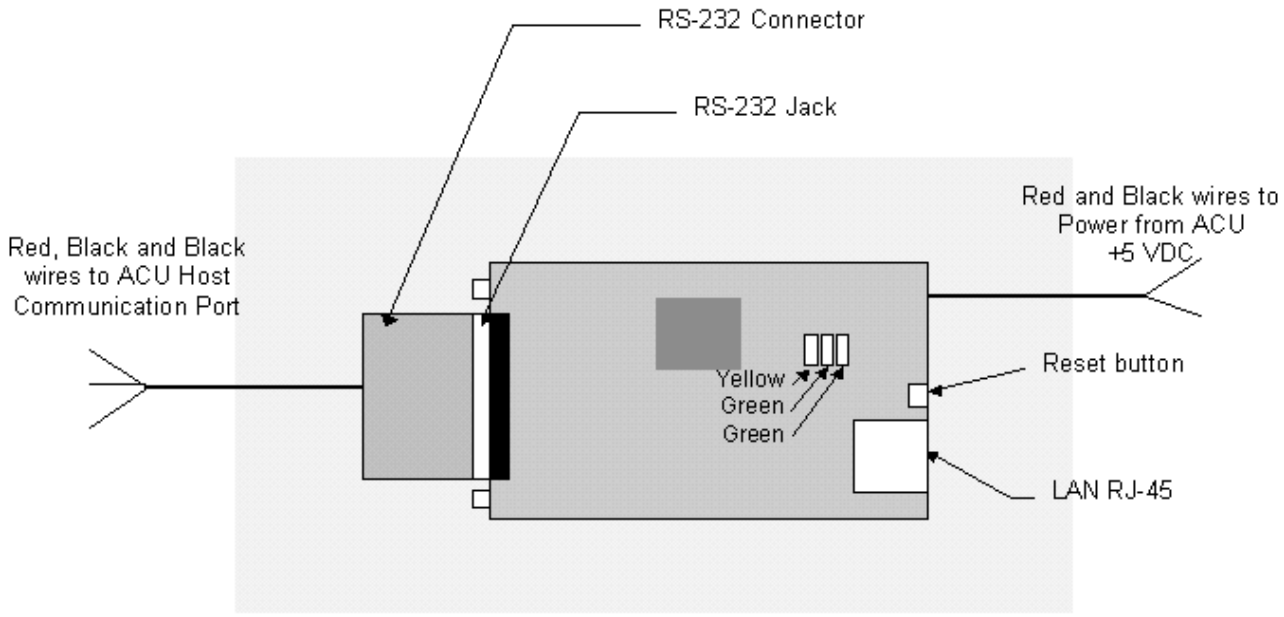

Figure 3-29: Detailed Drawing of the ACU-LAN Adapter.

NOTE: See Table 3-62 or Table 3-63 for proper wiring

ACU2 Only

Color:	Connect To:	Description
Red of pair	ACU2 TB5 - 4	+5V
Black of pair	ACU2 TB5 – 5	0V
Thick Black	ACU2 TB1 - 17	H1SG
Thin Black	ACU2 TB1 - 18	H1TD
Red	ACU2 TB1 - 19	H1RD

Table 3-62: ACU- LAN Adapter Cable Connections.

ACU-R2/R4

Color:	Connect To:	Description
Red of pair	ACU2 TB3 – 12	+5V
Black of pair	ACU2 TB3 – 11	0V
Thick Black	ACU2 TB1 – 6	H1SG
Thin Black	ACU2 TB1 – 7	H1TD
Red	ACU2 TB1 – 8	H1RD

Table 3-63: ACU- LAN Adapter Cable connections.

ACU LED Description

LED's	Description
Yellow	Red when transmitting data to the serial port. Flashing yellow if unit is functional
Green	Lights when a network in detected.
Green	Lights when power is applied

Table 3-64: ACU-LAN Adapter LED Indicators.

LAN Configuration for LAN Adapter Only

To reset the ACU-LAN Adapter to factory defaults:

1. Push and hold the reset button while applying power.

   Power up takes about 30 seconds to complete.
2. All three LED's on indicate successful power up, then the yellow LED will start flashing.

   The center green LED's should light if the unit is connected to a LAN.

   The ACU-LAN Adapter has a male 25-pin DTE RS-232 connector.

To configure the ACU-LAN Adapter:

1. Disconnect factory RS-232 cable and connect a terminal emulator (i.e. Window's Hyper Terminal) to the serial port of the ACU-LAN Adapter. A crossover cable and 'gender-changer' are required if using a personal computer. The ACU-LAN Adapter default is 9600-Baud, 1 Stop bit, No parity, 8 Data bits and Flow control set to None.

   When power is applied to the ACU-LAN Adapter, a message is sent to the terminal. The message varies depending on if a network is attached to the ACU-LAN Adapter.

```
Lantronix MSSLITE Initialization...
Ethernet Address: 00-80-a3-2a-9c-b3      Internet Address (undefined)

Flash ROM Version V1.0 (Jan 18, 1999)
Flash Version: V3.5/8(990118)

Current Diagnostics report:
   NVR Config:             Normal        Ram Size:              512 KB
   HW ID code:             Rev  1

   Errors:           Network

No network was detected.  Press a key within
10 seconds to access bootmode commands>

Skipping DHCP.
Request BOOTP: no valid reply received.
Request RARP:  no valid reply received.

Checking 2 sections from flash:
    From address 0x220018 to 0x220018, 252774 bytes) -> not copied.
    From address 0x25db92 to 0x20000, 4798 bytes) -> decompressed.
Loaded 261014 bytes.

Load Completed - Boot in Progress

%% Lantronix MSSLITE
%% Ethernet Address: 00-80-a3-2a-9c-b3      Internet Address (undefined)
```

2. Press the **Enter** key to get control of the ACU-LAN Adapter.

NOTE: If a typing error is made while following the steps below, use the arrow/up key one time to start the line over again. After typing a command and striking the "Enter" key, if no error is returned the command was accepted.

On the ACU-LAN Adapter, enter the commands shown in **bold type** after the prompts.

```
Username> SYSTEM
Local_1> SET PRIV
Password> SYSTEM      (will not appear)
Local_1>> CHANGE IPADDRESS xxx.xxx.xxx.xxx
```

Where xxx.xxx.xxx.xxx is the IP Address of the ACU-LAN Adapter.

Get the IP Address from the Network Administrator.

NOTE: If you have purchased the Multiple Server option SKIP THIS STEP and go to the next one.

Where yyy.yyy.yyyy.yyy is the IP Address of the Host computer.

Get the Subnet Mask from the Network Administrator.

```
Local_1>> CHANGE SUBNET MASK 255.255.255.0
Local_1>> CHANGE DEDICATED TCP yyy.yyy.yyy.yyy:3001U
```

NOTE: Enter the following step ONLY if you have purchased the Multiple Server option.

Multiple Server requires Lantronix MSSLITE Ver. B3.6/101.

```
Local_1>> CHANGE DEDICATED TCP :3###US030
```

"**#**" Use the number of the Server that the ACU will communicate to. For example, Server 4 would be entered as "`3004US030`"

Where zzz.zzz.zzz.zzz is the IP Address of the Network Router or Gateway. A router address may not be required. Check with the Network Administrator.

```
Local_1>> CHANGE GATEWAY zzz.zzz.zzz.zzz
```

```
Local_1>> CHANGE AUTOSTART ENABLED
Local_1>> CHANGE FLOW CONTROL NONE
```

NOTE: Changes go into effect only after a power up

Optional: Change the baud rate to 19200.

```
Local_1>> CHANGE SPEED 19200
```

Configuration Complete. Re-power the ACU-LAN Adapter or send the command to reinitialize the LAN Adapter by typing the following.

```
Local_1>> INIT DELAY 0
```

Remove the RS-232 connector to HyperTerminal from the LAN Adapter and reconnect it to the serial device.

Diagnostics and Testing for LAN Adapter

1. Connect the ACU-LAN Adapter to the Network.
2. From host computer, go to a command prompt. At the command prompt type:

   PING xxx.xxx.xxx.xxx

   Where xxx.xxx.xxx.xxx is the IP Address of the ACU-LAN Adapter.

   A valid response should be returned.

   If not check the Network configuration.
3. At the command prompt type: **Telnet**
4. Click “Connect”, then click “Remote System...”
5. For “Host Name”. Enter the IP address of the ACU-LAN Adapter

   The following screen should appear:

Lantronix MSSLITE Version V3.5/3(990118)

Type HELP at the 'Local_2> ' prompt for assistance.

Username>

Commands like **Show Ports** can check serial port configuration and the dedicated IP Address.

```
Local_2> show ports

Port 1: Username: Port_1                Physical Port 1 (Connected)
   Char Size/Stop Bits:         8/1     Baud Rate:                    9600
   Flow Ctrl:                  None     Session Limit:                   4
   Parity:                     None     Modem Control:                None
   Access:                  Dynamic     Break Ctrl:                  Local
   Local Switch:               None     Start Character:              None
   Forward:                    None     Backward:                     None
   Port name:                 Port_1    Terminal Type:                None
   Dedicated Service:    TCP: 123.123.123.101:3001U
   Characteristics:  Telnet Pad  Autostart

   Sessions:                      1     Current Session:123.123.123.101:3001U
   Input/Output Flow Ctrl:      N/N     DSR/DTR/CTS/RTS/CD:     Y/Y/Y/Y/N

   Seconds Since Zeroed:     720609     Framing Errors:                  0
   Accesses Local/Rem:          1/0     Parity Errors:                   0
   Flow Control Violations:       0     Overrun Errors:                  0
   Bytes Input:             1311558     Bytes Output:              1510770
   Input Flow On/Off:      0/     0     Output Flow On/Off:      0/     0

Local_2
```

Host Configuration of the ACU-LAN Adapter

Only software version 8.11.xx or above will support the ACU-LAN Adapter. In the host it is called a Server.

Procedure

1. First define the Serial Server, then define the ACU and configure the ACU to use the Serial Server.
2. On the Diamond application select “6-Setup”, then “1-System”, then “D-Serial Server” and lastly “New”.
3. For Name enter a description of the ACU-LAN Adapter. For IP Address enter the IP Address of the ACU-LAN Adapter. Click Save.
4. On the Diamond application select “6-Setup”, then “1-System”, then “3-SCP Device” and lastly click “New” or “Modify”. For Primary Port the drop down list should show the description of the ACU-LAN Adapter. Click Save.

NOTE: If any changes in the LAN Adapter setup are required, the LAN Adapter must be reset first by pushing and holding the reset button while power is applied.

DIP And Rotary Switches on The ACU2, R2, and R4

The locations of the DIP and rotary switches are shown in Figure 3-19 for ACU2 and Figure 3-21 for the ACU-R2 and ACU-R4. The 8-position DIP switch SW1 and Rotary SW2 should be set according to Table 3-65 and Table 3-66. The rotary switch SW2 provides polling address 0 to 15 (0 to 'F' hexadecimal) see Table 3-66. The 6-position DIP switch SW50 on the ACU2 should be set according to Table 3-67. The remaining DIP switches on the ACU-R2 and ACU-R4 (SW3, SW4 and SW5) should be set according to Table 3-68 through Table 3-70.

NOTE: The switches are read at power-up (or reset) and will be ignored thereafter. If it is necessary to change a setting, power *MUST* be cycled **OFF** then, *AFTER* the setting is changed, ON.

DIP Switch SW1 Settings on the ACU2, ACU-R2, and ACU-R4 Controllers

Switch SW1	Switch Setting			Function
	S1	**S2**	**S3**	**Host Communication Baud Rate**
	OFF	OFF	OFF	19200
S1	ON	OFF	OFF	300
	OFF	ON	OFF	600
Through	ON	ON	OFF	1200
	OFF	OFF	ON	1800
S3	ON	OFF	ON	2400
	OFF	ON	ON	4800
	ON*	ON*	ON*	9600
S4	ON			Host Encryption enabled
	OFF*			Host Encryption disable
S5	ON			Dial-Up Host Communications
	OFF*			Dedicated Host Communications
S6	ON			5- wire RS-232 using RTS & CTS
	OFF*			Use RS-485 or 3-wire RS-232
S7	ON			200 / 10 K ohm alarm termination
	OFF*			1K / 2K ohm alarm termination
S8	ON			Host Communication uses No Parity
	OFF*			Host Communication uses Even Parity

Table 3-65: DIP Switch SW1 Settings on the ACU2, R2, and R4 Controllers

* Denotes default setting.

CAUTION:

When setting switch S7 above, make sure the SCP Device “Termination Type” is correctly set in the Diamond software. Select menus 6-Setup, 1-System, 3-SCP Device, Modify, Advance page. Consult the Software Manual for detailed information.

Rotary Switch SW2 Settings on the ACU2, ACU-R2, and ACU-R4 Controllers

SW2 (rotary switch)	Function - Sets the ACU2 polling address
0 - F	0-9 = Address 0-9 and A-F = Address 10-15

Table 3-66: Rotary Switch SW2 Settings on the ACU2, ACU-R2, and ACU-R4 Controllers

DIP Switch SW50 Settings on the ACU2 Controller

Switch S50	ON = Terminated OFF = Not Terminated
S1	Host Port 1 RS-485 Transmit Data
S2	Host Port 2 RS-485 Receive Data
S3	Host Port 2 RS-485 Transmit Data
S4	Host Port 1 RS-485 Receive Data
S5	Reader Port 1 RS-485 Transmit Data
S6	Reader Port 1 RS-485 Receive Data
S7	Reader Port 2 RS-485 Transmit Data
S8	Reader Port 2 RS-485 Receive Data

Table 3-67: DIP Switch SW50 Settings on the ACU2 Controller

NOTE: Default is all ON, however only the farthest ACU2 controller should have its Host port terminated, on all others do not terminate the Host port.

DIP Switch SW3 Settings on the ACU-R2 and ACU-R4 Controllers

Switch SW3	Function
Switch 1 – 1st Reader	ON – Reader present; OFF –Reader not present
Switch 2 – 2nd Reader	
Switch 3 – 3rd Reader	Available for ACU-R4 only
Switch 4 – 4th Reader	Available for ACU-R4 only
Switch 5 – Reader Type	OFF = Magnetic ON = Wiegand or Proximity
Switch 6	Spare

Table 3-68: DIP Switch SW3 Settings on ACU-R2 and ACU-R4

DIP Switch SW4 Settings on the ACU-R2 and ACU-R4 Controllers

Switch SW4	ON Position = Terminated – No Input Device Present OFF Position = Not Terminated – Zone In Use With EOLR**
SW4-1	Terminates Zone Input R0Z0 with a 1k-ohm resistor.
SW4-2	Terminates Zone Input R0Z1 with a 1k-ohm resistor. *
SW4-3	Terminates Zone Input R1Z0 with a 1k-ohm resistor.
SW4-4	Terminates Zone Input R1Z1 with a 1k-ohm resistor. *
SW4-5	Terminates Zone Input R2Z0 with a 1k-ohm resistor.
SW4-6	Terminates Zone Input R2Z1 with a 1k-ohm resistor. *
SW4-7	Terminates Zone Input R3Z0 with a 1k-ohm resistor.
SW4-8	Terminates Zone Input R3Z1 with a 1k-ohm resistor. *

Table 3-69: DIP Switch SW4 Settings on ACU-R2 and ACU2-R4

* If the Exit Push Button is not connected, then another 1k resistor must be installed across the Zone Input.
** EOLR is End Of Line Resistor

DIP Switch SW5 Settings on the ACU-R2, and ACU-R4 Controllers

Switch S5	ON = Terminated OFF = Not Terminated
S1	Host Port 1 RS-485 Transmit Data
S2	Host Port 1 RS-485 Receive Data
S3	Reader Port 1 RS-485 Transmit Data
S4	Reader Port 1 RS-485 Receive Data
S5	Reader Port 2 RS-485 Transmit Data. *
S6	Reader Port 2 RS-485 Receive Data. *

Table 3-70: DIP Switch SW5 Settings on ACU2-R2 and ACU2-R4

* Available for ACU-R4 only

NOTE: Default is all ON, however only the farthest ACU-R2 or ACU-R4 controller should have its Host port terminated. On all others do not terminate the Host port.

Clearing the Memory on the ACU2, ACU-R2 and ACU-R4

To clear memory, first power off the ACU2, ACU-R2 and ACU-R4. Set the *even* switches (positions 2,4,6 & 8) on DIP switch SW1 to ON and the odd switches (positions 1,3,5 & 7) to OFF. Set the polling address of the Rotary Switch SW2 to F. Apply power to the ACU2, ACU-R2 or ACU-R4. Wait a minimum of 45 seconds for all memory to clear. LEDs 1-4 will blink together indicating that the operation is complete. Turn power off and reset switches SW1 and SW2 to the desired settings.

Jumper Configuration on ACU2 Controller

For ACU2 Controller's PCB Assembly jumper locations, refer to Figure Figure 3-19 and for jumper identifications, refer to Table Table 3-71.

Jumper	Setting	Description
W1	*Installed Removed	Watchdog Timer Enabled Watchdog Timer Disabled
W2	*A B	EPROM 27C040, 512K, 32-pin EPROM 27C020, 256K or smaller (Not Present on P/N135524 Boards)
W3	*A B	EPROM any 32-pin (27C010 or larger) EPROM any 28-pin (27C512 and smaller)
W4	*A B	EPROM 27C512, 64K or Larger, 28 or 32-pin EPROM 27C256, 32K, 28-pin
W50	*A B	Power Fail Detect Voltage = 4.5 volts Power Fail Detect Voltage = 4.75 volts

* = Default setting.

Table 3-71: ACU2 Controller's PCB Assembly Jumper Configurations

Jumper Settings ACU-R2 and ACU-R4 Controllers

For ACU-R2 and ACU-R4 controller's jumper locations, refer to Figure 3-21 and for jumper identifications refer to Table 3-72.

Jumper	Positions:	Description
W1	Not Present	Factory use only.
W2	(1&2) places 24V DC on relay common.	Relay 1 (K0)
	(2&3) relay common is open. *	
W3	(1&2) places 24V DC on relay common.	Relay 2 (K1)
	(2&3) relay common is open. *	
W4	(1&2) places 24V DC on relay common.	Relay 3 (K2)
	(2&3) relay common is open. *	
W5	(1&2) places 24V DC on relay common.	Relay 4 (K3)
	(2&3) relay common is open. *	
W6	Always leave the jumper in position.	Watch Dog Timer enabled.
W7	(B & C) * Leave the jumper installed.	Less than 256K Memory (default)
	(A & C) Not used	

Table 3-72: ACU-R Controller's PCB Assembly Jumper Configurations

* Default setting.

NOTE: 24Volts DC on each relay is limited to 0.5 Amps.

Power-Up Self-test on The ACU2 Controller

The ACU2 controller should always be tested after installing any module. The power-up self-test indicators for the ACU2 controller are LED1, LED2, LED3, and LED4 on the ACU2 Controller's PCB Assembly (See Figure 3-19). The LED's will light as follows (at power-up), all ON at hardware reset, then all OFF:

LED	Description
LED1 (GREEN)	ON indicating power-up
LED2 (YELLOW)	ON when successful RAM test finished (Blinks once if 1-Mbyte RAM installed)
LED3 (GREEN)	ON when successful PROM test finished
LED4 (YELLOW)	ON when initialization completed (1 second)

Table 3-73: ACU2 Power Up Test LED Status

Power-Up Self-test on the ACU-R2 and ACU-R4

The ACU-R2 and ACU-R4 should always be tested after installing any module. The power-up self-test indicators are for both the ACU-R2 and ACU-R4 controller (See Figure 3-21). The LED's will light as follows at power-up, all ON at hardware reset, then all OFF:

LED	Description
LED9 (GREEN)	ON indicating power-up
LED10 (YELLOW)	ON indicating successful RAM test (Blinks once if 1-Mbyte RAM installed)
LED11 (GREEN)	ON indicating successful PROM test
LED12 (YELLOW)	ON indicating initialization complete (1 second)

Table 3-74: Power-Up LED Status for ACU2-R2 and ACU2-R4

Online Tests on ACU2 Controller

The normal operating indicators for the ACU2 controller are indicated by LED's 1 - 6 (See Figure 3-19). The LED's on the ACU2 controller's PCB will light as follows:

LED	Description
LED1 (GREEN)	Flashes at a 1 Hz rate
LED2 (YELLOW)	ON while transmitting to the Remote Modules
LED3 (GREEN)	Two seconds OFF, then blinks once if ACU Reader 0 is online, followed by blinking twice if ACU Reader 1 is online, etc.
LED4 (YELLOW)	ON if zone monitor voltage reference is ever out of range (indicates board or power supply failure)
LED5 (GREEN)	ON when transmitting data to host
LED6 (YELLOW)	ON when receiving data from host

Table 3-75: ACU2 Online Test LED Status for ACU2

Online Tests ACU-R2 and R4

LED's 1–4 and LED's 9-14 indicate the normal operations for the ACU-R2 and ACU-R4 controllers. The LEDs:ACU-R2 or ACU-R4 light as follows:

LED	Description
LED1 PWR (RED)	Power LED- remains on with power applied.
LED2 RX (RED)	ON while Receiving from the Reader Modules
LED 3 TX (RED)	ON while Transmitting to the Reader Modules
LED 4 HB (RED)	Flashes at a 1 Hz rate. Reader processor pulse.
LED9 (GREEN)	Flashes at a 1 Hz rate. ACU processor pulse.
LED10 (YELLOW)	ON while transmitting to the Remote Modules
LED11 (GREEN)	Two seconds OFF, then blinks once if ACU Reader 1 is online, then twice if ACU Reader 2 is online, etc.
LED12 (YELLOW)	ON for a few seconds when power is applied then stays OFF. Currently not used for diagnostics.
LED13 (GREEN)	ON when transmitting data to host.
LED14 (YELLOW)	ON when receiving data from host.

Table 3-76: Normal LED Status for ACU2-R2 and ACU2-R4

ACU2X Networked Controllers

The ACU2X is a legacy product that is no longer sold by GE. The information in this section is offered in support of those who are still operating an ACU2X. The ACU2X was also available in a 16-reader version.

Wiring ACU2X

Note the following when running the cables and wires:

- In running cables and wires, be sure to observe and follow applicable codes.
- The dry relay contacts are rated at 2 amp at 30 AC/DC volts.
- All wires should be stranded.
- The maximum length of the wiring between the farthest Remote Module (One-Stage Reader, RRE-2, SMT RIM, or SMT RRM) and the ACU2 controller is 4000 ft. (1220 m) provided the remote module is locally powered. If supplying power to the remote module form the ACU2X or ACUXL the maximum distance is 500 feet.
- Guard against lightning damage.
- All bare Shields should be taped or protected against accidental shorting against electronic components.

Terminal Block Connections

All ACU2X Terminal Block connections (TB1 through TB5) are the same as the ACUXL. See Table Table 3-48 through Table 3-61.

DIP Switch Settings ACU2X

The locations of the various DIP switches on the ACU2X are shown Figure Figure 3-6. They are the same as on the ACUXL

Dial-up Modem Card for ACU2X

The optional daughter board Dial-Up modem can be easily installed into the ACU2X controller.

Refer to the section on installing the modem card for the ACUXL on page 3-11. They are the same. The Dial-up modem card may not be installed if the installation is to be UL 1076 and/or UL 294 approved.

NOTE: A battery backup or UPS is highly recommended for any ACU Device using Dial-up.

Chapter 4

One-Stage Reader

New Surface Mount Technology RMS/RPX Reader

The SMT RMS/RPX Reader is a single stage design that includes a swipe/pass-through read head and an electronic interface to the ACU controller in a single housing.

NOTE: The information in the manual refers specifically to the RMS reader. If you have an RPX reader, all the settings and information are the same with the exception of the read head technology switches on DIP switch SW1. These switches are set at the factory. Do not adjust the switches of this read head or it will not function.

Overview

Each reader may also include an optional 32-character LCD display that allows the use of text messages providing user prompts or event notices.

LED lamps on the board (red, yellow, green) visually indicate reader status and an audible annunciation provides response to keypad entries and door alarm conditions.

The RMS Reader can be configured in three modes: card only, card with keypad, or keypad only.

The RMS Reader has four supervised alarm inputs, They can be configured for door contact input, request-to-exit input and two general-purpose alarm points. The RMS Reader also has a solid-state output that can be used to operate the door strike.

The reader also provides two Single Pole Double Throw relays. One relay can be used for the door strike. The other relay can be used for remote control functions. The RMS reader uses surface mount technology. The RMS Reader is shown in Figure 4-1.

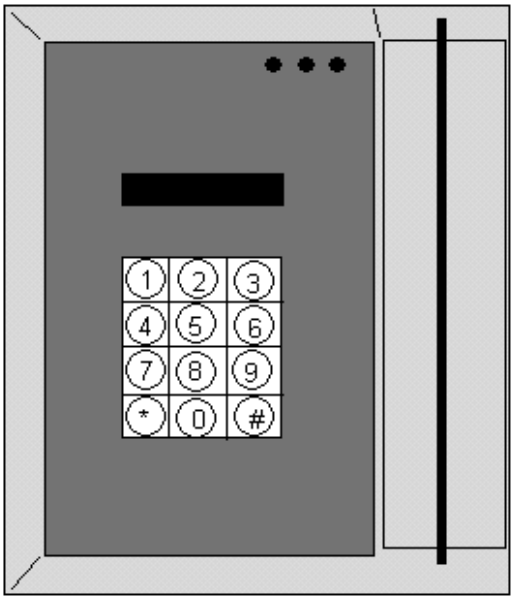

Figure 4-1: One-Stage Reader (With LCD and Keypad)

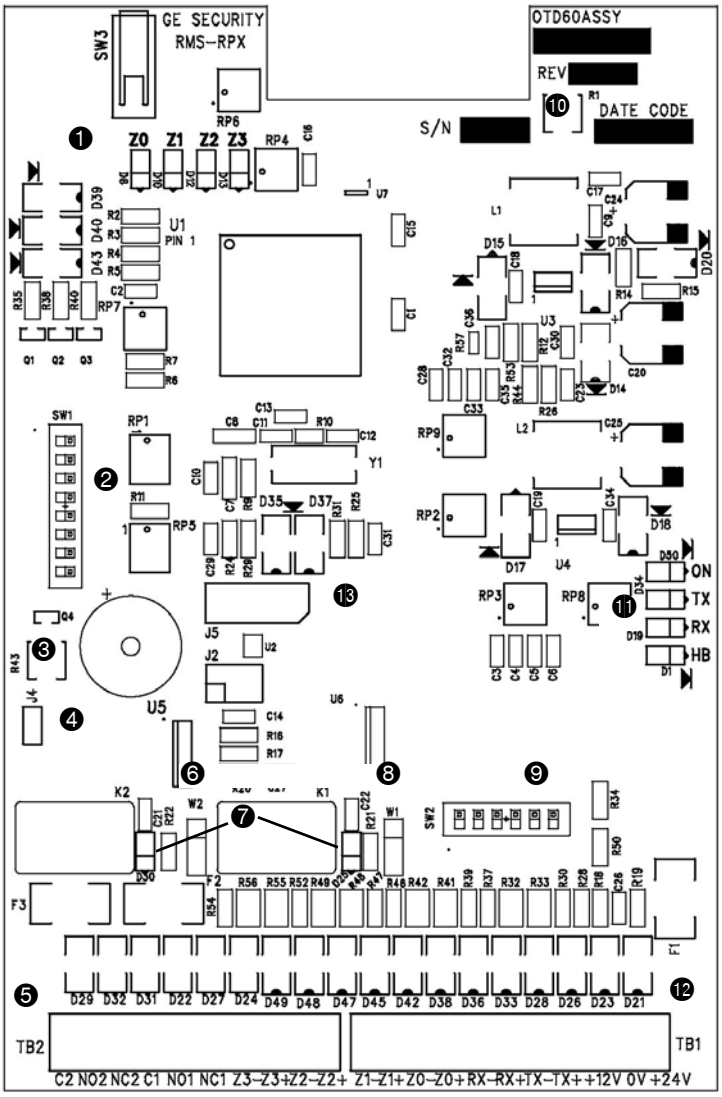

Figure 4-2: Location of components on the SMT RMS Reader

❶ LEDs see Table 4-6

❷ DIP Switch SW1 see Table 4-3

❸ Beeper volumn control see 4-25

❹ Two prong power for RPX read head

❺ Terminal Block TB1 see Table 4-1

❻ Jumper W2 see Table 4-5

❼ LED indicators for reader relays

❽ Jumper W1 see Table 4-5

❾ DIP Switch SW2 see Table 4-4

❿ LCD contrast control see page 4-25

⓫ LEDs see Table 4-6

⓬ Terminal Block TB2 see Table 4-2

⓭ Read Head connector

Terminal Board connections

Terminal boards are wired to a controller depending on the number and position of the reader. See UL Specifications section for additional information

Pin No.	Term Strip	Description	Reader Terminal TB1 Connected to:	Cable Color (Installer defined)
1	+24V	+ 24 Volts In	ACU TB2-7 (+24V)	
2	0V	Ground	ACU TB2-8 (0V)	
3	+12V	+12 VDC 0.4 A max		
4	TX+	From ACU TX (+)	ACU TB2-9 (R1T+)	
5	TX-	From ACU TX (-)	ACU TB2-10 (R1T-)	
6	RX+	From ACU RX(+)	ACU TB2-11 (R1R+)	
7	RX-	From ACU RX (-)	ACU TB2-12 (R1R-)	
8	Z0+	Zone Input 0 (+)	Door Contact	
9	Z0-	Zone Input 0 (-)	Door Contact	
10	Z1+	Zone Input 1 (+)	Exit Push Button	
11	Z1-	Zone Input 1 (-)	Exit Push Button	

Table 4-1: Terminal Board TB1 wiring

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TB2 wiring connections

Pin No.	Term Strip	Description	Reader TB2 Connected to:	Cable Color (Installed)
1	Z2+	Zone Input 2 (+)	Aux Alarm Input 1	
2	Z2-	Zone Input 2 (-)	Aux Alarm Input 1	
3	Z3+	Zone Input 3 (+)	Aux Alarm Input 2	
4	Z3-	Zone Input 3 (-)	Aux Alarm Input 2	
5	NC1	Door Strike Relay Normally Closed[a]		
6	NO1	Door Strike Relay Normally Open[a]		
7	C1	Door Strike Relay Common[a] [b]		
8	NC2	Aux Relay Normally Closed		
9	NO2	Aux Relay Normally Open		
10	C2	Aux Relay Common[b]		

a. Can be configured for Door Strike output. The default for the door strike is on the ACU Controller
b. Current for each relay contact limited to 2 amps

Table 4-2: Terminal Board TB2 wiring connections

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CAUTION:

For the RMS reader, 24 VDC is applied to the Door Strike relay if jumper W1 is in the 1-2 position. 24 VDC is applied to the Auxiliary relay if jumper W2 is in the 1-2 position.

DIP Switch Settings

The 8-position DIP switch (SW1) located on the left edge of the RMS circuit board (see Figure 4-2) controls the reader address. Use Table 4-3 to select the correct settings. The 6-position DIP switch (SW2) located in the lower right quadrant of the RMS circuit board (see Figure 4-2) controls line termination. Use Table 4-4 to select the correct termination.

Reader Number	Reader Address	Reader Port	S1	S2	S3
0	0	1	OFF	OFF	OFF
1	1	1	ON	OFF	OFF
2	2	1	OFF	ON	OFF
3	3	1	ON	ON	OFF
4	0	2	OFF	OFF	OFF
5	1	2	ON	OFF	OFF
6	2	2	OFF	ON	OFF
7	3	2	ON	ON	OFF
8	4	1	OFF	OFF	ON
9	5	1	ON	OFF	ON
10	6	1	OFF	ON	ON
11	7	1	ON	ON	ON
12	4	2	OFF	OFF	ON
13	5	2	ON	OFF	ON
14	6	2	OFF	ON	ON
15	7	2	ON	ON	ON

Read Head Technology [a]	S4	S5
Magstripe Track 2 or 3	OFF	OFF
Magstripe with Wiegand Input Signaling	ON	OFF
Wiegand	OFF	ON
Magstripe Track 1 Format	ON	ON

a. These switches are set at the factory. DO NOT adjust them. The read head will not function.

Switch Number	Description
S6	Spare (Not Used)
S7	Spare (Not Used)
S8 Zone Termination	OFF = Special Customer Configuration
	ON = Special Customer Configuration

Table 4-3: DIP Switch SW1 Settings

NOTE: The switches are read at power-up (or reset) and will be ignored thereafter. If it is necessary to change a setting, disconnect the power, make the required setting changes and then reapply the power to the reader

SW2	Termination
1	ON = TX Reader Comm Termination (com ACU to RRE)
2	ON = RX Reader Comm Termination (com ACU to RRE)
3	ON = Internally Terminate Zone 3 with 1 K ohm, OFF = Not terminated
4	ON = Internally Terminate Zone 2 with 1 K ohm, OFF = Not terminated
5	ON = Internally Terminate Zone 1 with 1 K ohm, OFF = Not terminated
6	ON = Internally Terminate Zone 0 with 1 K ohm, OFF = Not terminated

Table 4-4: DIP switch settings for SW2

Jumper settings

The two jumpers located on the RMS reader (See Figure 4-2) are used to indicate whether the relays on the reader are wet or dry. The default setting is for dry relays.

Jumper Location	Jumper	Action
Relay 1 (Door Strike)		
W1	1 and 2	Strike Relay Wet (24 VDC)
W1	2 and 3 [a]	Strike Relay Dry
Relay 2 (Aux)		
W2	1 and 2	Aux Relay Wet (24 VDC)
W2	2 and 3 [a]	Aux Relay Dry

a. This is the default setting

Table 4-5: Jumper settings

LED indicators

The LEDs on the RMS reader provide information about the activity of the reader. Table 4-6 indicates reader activity.

LED	Description
ON	ON when power is supplied
Rx	Flashing when transmitting data to ACU
Tx	Flashing when receiving data from ACU
HB	Flashing once per second indicates CPU is up and running
Z0	**On** = Alarm **Off** = Secure **Blinking** = Circuit Fault
Z1	**On** = Alarm **Off** = Secure **Blinking** = Circuit Fault
Z2	**On** = Alarm **Off** = Secure **Blinking** = Circuit Fault
Z3	**On** = Alarm **Off** = Secure **Blinking** = Circuit Fault
R21	On when the relay is active
R22	On when the relay is active

Table 4-6: LED Indicators on the reader

Alarm Zone Assignments

Reader Physical Zones	Z0[a]	Z1[b]	Z2	Z3
Reader 0	16	17	18	19
Reader 1	20	21	22	23
Reader 2	24	25	26	27
Reader 3	28	29	30	31
Reader 4	32	33	34	35
Reader 5	36	37	38	39
Reader 6	40	41	42	43
Reader 7	44	45	46	47
Reader 8	128	129	130	131
Reader 9	144	145	146	147
Reader 10	160	161	162	163
Reader 11	176	177	178	179
Reader 12	192	193	194	195
Reader 13	208	209	210	211
Reader 14	224	225	226	227
Reader 15	240	241	242	243

a. Z0 default is Door Contact
b. Z1 default is Exit Push Button

Table 4-7: Physical Reader Zones

NOTE: If Z0 and Z1 are used for Door Contact and Exit Push Button sensors, then the alarm numbers in these columns are used to report a trouble condition at the sensor.

Logical Alarm Zones	Door Forced Open	Door Held Open	Reader Tamper	Reader Off-line
Reader 0	64	65	66	67
Reader 1	68	69	70	71
Reader 2	72	73	74	75
Reader 3	76	77	78	79
Reader 4	80	81	82	83
Reader 5	84	85	86	87
Reader 6	88	89	90	91
Reader 7	92	93	94	95
Reader 8	96	97	98	99
Reader 9	100	101	102	103
Reader 10	104	105	106	107
Reader 11	108	109	110	111
Reader 12	112	113	114	115
Reader 13	116	117	118	119
Reader 14	120	121	122	123
Reader 15	124	125	126	127

Table 4-8: Logical alarm zones

Relay Assignments

Reader	DIAMOND II
Reader 0 Door Strike Output Reader 0 Aux Relay	16[a] 17
Reader 1 Door Strike Output Reader 1 Aux Relay	18 [a] 19
Reader 2 Door Strike Output Reader 2 Aux Relay	20 [a] 21
Reader 3 Door Strike Output Reader 3 Aux Relay	22 [a] 23
Reader 4 Door Strike Output Reader 4 Aux Relay	24 [a] 25
Reader 5 Door Strike Output Reader 5 Aux Relay	26 [a] 27
Reader 6 Door Strike Output Reader 6 Aux Relay	28 [a] 29
Reader 7 Door Strike Output Reader 7 Aux Relay	30 [a] 31
Reader 8 Door Strike Output Reader 8 Aux Relay	32 [a] 33
Reader 9 Door Strike Output Reader 9 Aux Relay	34 [a] 35
Reader 10 Door Strike Output Reader 10 Aux Relay	36 [a] 37
Reader 11 Door Strike Output Reader 11 Aux Relay	38 [a] 39
Reader 12 Door Strike Output Reader 12 Aux Relay	40 [a] 41
Reader 13 Door Strike Output Reader 13 Aux Relay	42 [a] 43
Reader 14 Door Strike Output Reader 14 Aux Relay	44 [a] 45
Reader 15 Door Strike Output Reader 15 Aux Relay	46 [a] 47

a. This assignment uses the reader door strike

Table 4-9: Relay numbers

LCD Display Contrast Adjustment

The LCD contrast has been adjusted at the factory. The following steps will aid the user if an adjustment change is desired.

1. Remove the reader from the mounting plate.
2. Access and adjust the Contrast Control (See Figure 4-2) on the reader for the desired LCD contrast.
3. Reinstall the reader.

Buzzer Volume Adjustment

The Buzzer Volume has been adjusted at the factory. The following steps will aid the user if an adjustment change is desired.

1. Remove the reader from the mounting plate.
2. Access and adjust the Buzzer Volume Control (See Figure 4-2) on the reader for the desired loudness.
3. Reinstall the reader.

Reader Status LCDs

Each reader has three LCD indicators and a buzzer that indicates reader status.

State	Red	Yellow	Green	Beep
Online	On	Dim Flash	Off	None
Off-Line	Off	Dim Flash	Dim Flash	None
Access Grant	Off	Dim Flash	Flashes	One 2-Second Beep
Door Unlocked	Off	Dim Flash	ON	None
Access Denied	Off	Dim Flash	Off	Three 1/2-Second Beeps
Not Configured	Off	Dim Flash	Off	None
Door In Alarm	Bright Flash	Bright Flash	Bright Flash	Interrupted Beep
Door In alarm (Masked)	Bright Flash	Bright Flash	Bright Flash	None
Enter Keypad	Off	Bright Flash	Off	None
Key Pressed	Flash	Bright Flash	Flash	When Keypad Pressed
Second Card	Bright Flash	Dim Flash	Off	None
Area Secure	On	Dim Flash	Off	One-4-Second Beep
Area Unsecured	Off	Dim Flash	On	Two 2-Second Beeps
Power-Up	All Off Green On Yellow On if RAM OK Red On if PROM OK Pause one second, then yellow heartbeat (Dim Flash)			

Table 4-10: Status LCDs on the front of the RMS reader

Paired Reader Operation

Readers on the same ACU controller can be configured as paired readers. The configuration allows readers to operate as 'in' and 'out' readers for a single door with or without exit push button. Mode changes for paired readers will affect both readers. Commands sent to the first reader of the pair are accepted. Commands sent to the second reader of a pair are ignored.

Paired readers share a single door contact.

The door contact is wired to the first reader of the pair. Unused input zones can be used for more alarms or terminated with a resistor (see Table 4-2)

The Door Strike relays can be configured to operate a single relay (for a door) or separately (for a turnstile).

Keypad Access Request

The reader can be configured from the host computer to allow a card number to be entered from the keypad as well as accept card swipes. The number of digits to be entered is configurable from 1 to 9 digits.

The card number entered from the keypad is processed like a card swipe access request (except there is no test for issue code) with or without an additional PIN keypad number. Digits are entered until the count is reached or the '*' is entered. The '#' key clears currently entered digits.

Auxiliary power supply

In most cases the controller can supply the power for the RMS Reader. When the controller cannot supply power, an auxiliary power supply may be used. When using an auxiliary power supply, make sure the 0V terminal on all Remote modules are connected back to the auxiliary power supply and to the 0V terminal of the controller.

IKE, RMS, RPX, and RWE

The One-Stage Readers are a single stage design that includes a swipe/pass-through or proximity reader and the electronic interface to the ACU controller (See Figure 4-1). Each may also include an optional 32-character LCD display that allows the use of various text messages for user prompts or event notices.

LED lamps (red, yellow, green) visually display reader status with an internal audible annunciation providing response to keypad entries and door alarm conditions.

The One-Stage Readers can be configured for card only, card with keypad, or keypad only mode.

The One-Stage Readers include four supervised alarm inputs that are user-configured for door contact, request-to-exit and two general-purpose alarm points. The One-Stage Reader also has a solid-state output that can be configured to operate the door strike.

The One-Stage HP Reader provides two Single Pole Double Throw relays. One relay can be used for the door strike. The other relay can be used for remote control functions. The One-Stage HP Reader is shown in Figure 4-5.

This section contains instructions for:

- Terminal Block Connector Pin Numbers on the One-Stage Reader
- Setting the DIP Switch on the One-Stage Reader
- One-Stage Reader Alarm Zone Assignments

Auxiliary Power Supply for One-Stage Reader

In most cases the ACU can supply the power for the One-Stage reader. When the ACU cannot supply power an auxiliary power supply may be used. When using an auxiliary power supply make sure the 0V terminal on all Remote modules are connected back to the auxiliary power supply.

Terminal Connector PIN Numbers on a One-Stage Reader

Table 4-11 and Table 4-12 show One-Stage Reader wiring connections. Refer to Chapter 3, Table 3-49 for applicable ACU controller connections and cable identifications. See UL Specifications section for additional information.

One-Stage Reader Wiring Connections - Readers 0 Through 3

Pin No.	Term Strip	Description	Reader Terminal TB1 Connected to:	Cable Color (Filled in by Installer)
1	+24V	+ 24 Volts In	ACU TB2-7 (+24V)	
2	0V	Ground	ACU TB2-8 (0V)	
3	AUX	Not Applicable - Not Used - **Make No Connection**		
4	TX+	From ACU TX (+)	ACU TB2-9 (R1T+)	
5	TX-	From ACU TX (-)	ACU TB2-10 (R1T-)	
6	RX+	From ACU RX(+)	ACU TB2-11 (R1R+)	
7	RX-	From ACU RX (-)	ACU TB2-12 (R1R-)	
8	Z0+	Zone Input 0 (+)	Door Contact	
9	Z0-	Zone Input 0 (-)	Door Contact	
10	Z1+	Zone Input 1 (+)	Exit Push Button	
11	Z1-	Zone Input 1 (-)	Exit Push Button	
12	Z2+	Zone Input 2 (+)	Aux Alarm Input 1	
13	Z2-	Zone Input 2 (-)	Aux Alarm Input 1	
14	Z3+	Zone Input 3 (+)	Aux Alarm Input 2	
15	Z3-	Zone Input 3 (-)	Aux Alarm Input 2	
16	DS	Door Strike Output Normally Open (See Figure 2-9) *		

Table 4-11: One-Stage Reader Wiring Connections - Readers 0 Through 3

* Can be configured for door Strike output. **Default for door strike** is on the ACU Controller. See Table 4-21.

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NOTES:

- Each ACU controller has 2 module ports. Four readers may be multi-dropped on each port along with Remote Relay Modules (RRM16-E1L) and Remote Input Modules (RIM16-E1L).
- Install RS-485 termination on the farthest remote reader or module.
- RS-485 terminator is part number ACU-EOLRS.
- Readers should be Multi-dropped with no longer than a 10 ft. stub to the reader.
- Belden Cable No. 9409-18 suggested for door strikes.
- Belden Cable No. 9407-22 AWG suggested for zone sensors.
- Terminate any unused zone inputs.

One-Stage Reader Wiring Connections - Readers 4 Through 7

Pin No.	Term Strip	Description	Reader Terminal TB1 Connected to:	Cable Color (Filled in by Installer)
1	+24V	+ 24 Volts In	ACU TB2-1 (+24V)	
2	0V	Ground	ACU TB2-2 (0V)	
3	AUX	Not Applicable - Not Used - Make No Connection		
4	TX+	From ACU TX (+)	ACU TB2-3 (R2T+)	
5	TX-	From ACU TX (-)	ACU TB2-4 (R2T-)	
6	RX+	From ACU RX(+)	ACU TB2-5 (R2R+)	
7	RX-	From ACU RX (-)	ACU TB2-6 (R2R-)	
8	Z0+	Zone Input 0 (+)	Door Contact	
9	Z0-	Zone Input 0 (-)	Door Contact	
10	Z1+	Zone Input 1 (+)	Exit Push Button	
11	Z1-	Zone Input 1 (-)	Exit Push Button	
12	Z2+	Zone Input 2 (+)	Aux Alarm Input 1	
13	Z2-	Zone Input 2 (-)	Aux Alarm Input 1	
14	Z3+	Zone Input 3 (+)	Aux Alarm Input 2	
15	Z3-	Zone Input 3 (-)	Aux Alarm Input 2	
16	DS	Door Strike Output Normally Open (See Figure 2-9) *		

Table 4-12: One-Stage Reader Wiring Connections - Readers 4 Through 7

* Can be configured for door Strike output. Default for door strike is on the ACU Controller. See Table 4-21.

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NOTES:

- Each ACU controller has 2 module ports. Four readers may be multi-dropped on each port along with Remote Relay Modules (RRM16-E1L) and Remote Input Modules (RIM16-E1L).
- Install RS-485 termination on the farthest remote reader or module.
- RS-485 terminator is part number ACU-EOLRS.
- Readers should be Multi-dropped with no longer than a 10 ft. stub to the reader.
- Belden Cable No. 9409-18 suggested for door strikes.
- Belden Cable No. 9407-22 AWG suggested for zone sensors.
- Terminate any unused zone inputs.

Connector PIN Numbers on a One-Stage HP Reader

Table 4-13 though Table 4-15 shows One-Stage Reader wiring connections. Refer to Chapter 3, Table 3-49 for applicable ACU controller connections and cable identifications. See UL Specifications section for additional information

One-Stage HP Reader TB1 Wiring Connections - Readers 0 Through 3

Pin No.	Term Strip	Description	Reader Terminal TB1 Connected to:	Cable Color (Filled in by Installer)
1	+24V	+ 24 Volts In	ACU TB2-7 (+24V)	
2	0V	Ground	ACU TB2-8 (0V)	
3	+12V	+12 VDC 0.4 A max		
4	TX+	From ACU TX (+)	ACU TB2-9 (R1T+)	
5	TX-	From ACU TX (-)	ACU TB2-10 (R1T-)	
6	RX+	From ACU RX(+)	ACU TB2-11 (R1R+)	
7	RX-	From ACU RX (-)	ACU TB2-12 (R1R-)	
8	Z0+	Zone Input 0 (+)	Door Contact	
9	Z0-	Zone Input 0 (-)	Door Contact	
10	Z1+	Zone Input 1 (+)	Exit Push Button	
11	Z1-	Zone Input 1 (-)	Exit Push Button	

Table 4-13: One-Stage HP Reader TB1 Wiring Connections - Readers 0 Through 3

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NOTES:

- Each ACU controller has 2 module ports. Four readers may be multi-dropped on each port along with Remote Relay Modules (RRM16-E1L) and Remote Input Modules (RIM16-E1L).
- Install RS-485 termination on the farthest remote reader or module.
- RS-485 terminator is part number ACU-EOLRS.
- Readers should be Multi-dropped with no longer than a 10 ft. stub to the reader.
- Belden Cable No. 9409-18 suggested for door strikes.
- Belden Cable No. 9407-22 AWG suggested for zone sensors.
- Terminate any unused zone inputs.

One-Stage HP Reader TB1 Wiring Connections - Readers 4 Through 7

Pin No.	Term Strip	Description	Reader Terminal TB1 Connected to:	Cable Color (Filled in by Installer)
1	+24V	+ 24 Volts In	ACU TB2-1 (+24V)	
2	0V	Ground	ACU TB2-2 (0V)	
3	+12	+12 VDC 0.4 A max		
4	TX+	From ACU TX (+)	ACU TB2-3 (R2T+)	
5	TX-	From ACU TX (-)	ACU TB2-4 (R2T-)	
6	RX+	From ACU RX(+)	ACU TB2-5 (R2R+)	
7	RX-	From ACU RX (-)	ACU TB2-6 (R2R-)	
8	Z0+	Zone Input 0 (+)	Door Contact	
9	Z0-	Zone Input 0 (-)	Door Contact	
10	Z1+	Zone Input 1 (+)	Exit Push Button	
11	Z1-	Zone Input 1 (-)	Exit Push Button	

Table 4-14: One-Stage HP Reader TB1 Wiring Connections - Readers 4 Through 7

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NOTES:

- Each ACU controller has 2 module ports. Four readers may be multi-dropped on each port along with Remote Relay Modules (RRM16-E1L) and Remote Input Modules (RIM16-E1L).
- Install RS-485 termination on the farthest remote reader or module.
- RS-485 terminator is part number ACU-EOLRS.
- Readers should be Multi-dropped with no longer than a 10 ft. stub to the reader.
- Belden Cable No. 9409-18 suggested for door strikes.
- Belden Cable No. 9407-22 AWG suggested for zone sensors.
- Terminate any unused zone inputs.

One-Stage HP Reader TB2 Wiring Connections Alarm and Relay

Pin No.	Term Strip	Description	Reader Terminal TB2 Connected to:	Cable Color (Filled in by Installer)
1	Z2+	Zone Input 2 (+)	Aux Alarm Input 1	
2	Z2-	Zone Input 2 (-)	Aux Alarm Input 1	
3	Z3+	Zone Input 3 (+)	Aux Alarm Input 2	
4	Z3-	Zone Input 3 (-)	Aux Alarm Input 2	
5	NC1	Door Strike Relay N.C.*		
6	NO1	Door Strike Relay Normally Open *		
7	C1	Door Strike Relay Common.* **		
8	NC2	Aux Relay Normally Closed		
9	NO2	Aux Relay Normally Open		
10	C2	Aux Relay Common**		

Table 4-15: One-Stage HP Reader TB2 Wiring Connections

* **Can be** configured for Door Strike output. **Default for door strike** is on the ACU Controller. See Table 4-21

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CAUTION:

For the One-Stage HP Reader, 24 VDC is applied to the Door Strike relay if fuse “F2” is installed. 24 VDC is applied to the Auxiliary relay if fuse “F3” is installed. Remove the fuses to make this relay’s from dry contact. See Figure 4-5.

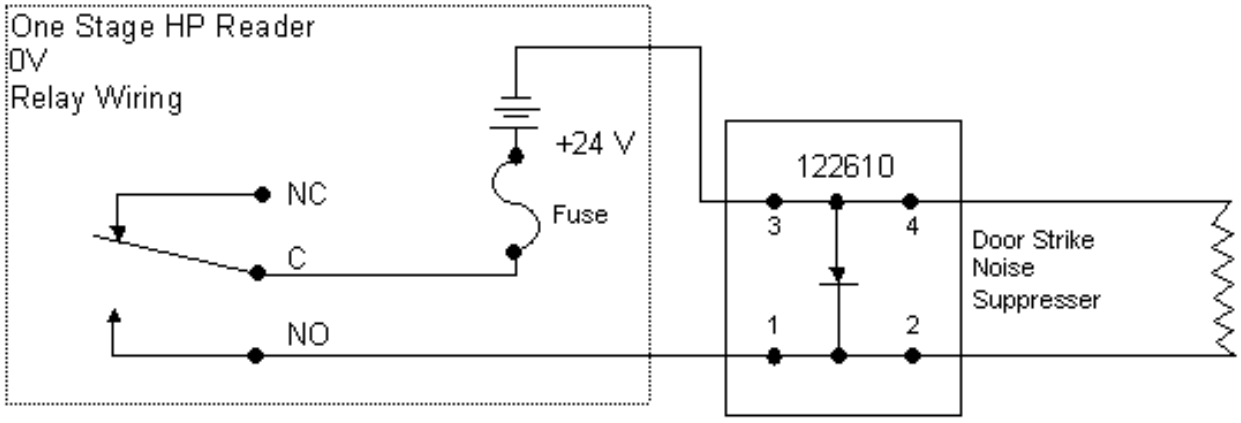

Figure 4-3: Door Strike Wiring for One-Stage HP Reader

(With Fuse “F2” installed, the reader supplies +24 VDC @ 1 Amp for the door strike relay 1. With Fuse “F2” removed, the relay has a dry contact).

Replacement fuse should be 2 Amp Littlefuse part number 2A@250V (GE Security part number 135056).

DIP Switch Settings for One-Stage Reader

The 6-position DIP switch (SW2) located on the One-Stage Reader (see Figure 4-4 and Figure 4-5) should be set according to Table 4-16 or Table 4-17.

NOTE: The switches are read at power-up (or reset) and will be ignored thereafter. If it is necessary to change a setting, power MUST be cycled OFF then, AFTER the setting is changed, ON.

Switch Settings pre version ARDR8N

Switch	Function
Switches 1 & 2 - Communication Address:	2 = OFF 1 = OFF Address 0 2 = OFF 1 = ON Address 1 2 = ON 1 = OFF Address 2 2 = ON 1 = ON Address 3
Switch 3 - Alarm Termination	OFF = 500/1K/2K ohms ON = 200/10K ohms
Switch 4	OFF = Normal ON = The LCD will display the encoded data on magnetic striped badges.
Switch 5 - Read Head Type	OFF = Magnetic ON = Wiegand or Proximity
Switch 6	Spare

Table 4-16: One-Stage Reader DIP Switch Settings

Switch Settings Version ARDR8N and later

Switch	SW1	SW2	SW3	Address
Switches 1, 2 & 3 Communication Address:	OFF	OFF	OFF	0
	ON	OFF	OFF	1
	OFF	ON	OFF	2
	ON	ON	OFF	3
	OFF	OFF	ON	*4
	ON	OFF	ON	*5
	OFF	ON	ON	*6
	ON	ON	ON	*7

Switches 4 & 5 Reader support	SW4	SW5	
	OFF	OFF	Magnetic stripe on Track 2 or 3
	OFF	ON	Wiegand
	ON	OFF	Magnetic format on Wiegand input
	ON	ON	Magnetic on Track 1
Switch 6	Spare		

Table 4-17: RRE DIP Switch Settings

* Used with ACU/16 option ONLY

NOTE: Previous to PROM Revision “ARDR8N”, Switch 3 was used to set the type of alarm termination.

Component and Switch Location

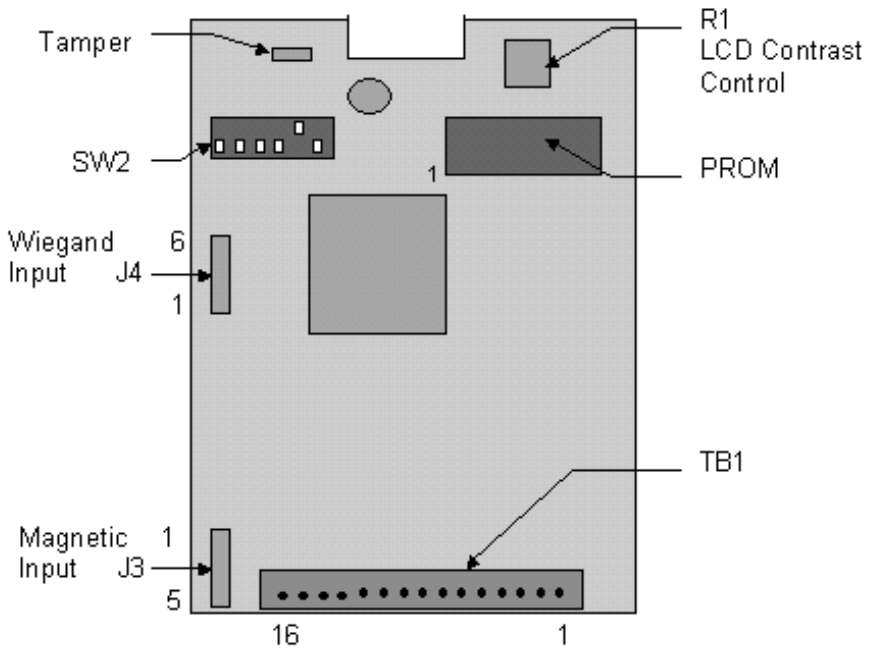

Figure 4-4: Location of DIP Switch (SW2) on the One-Stage Reader

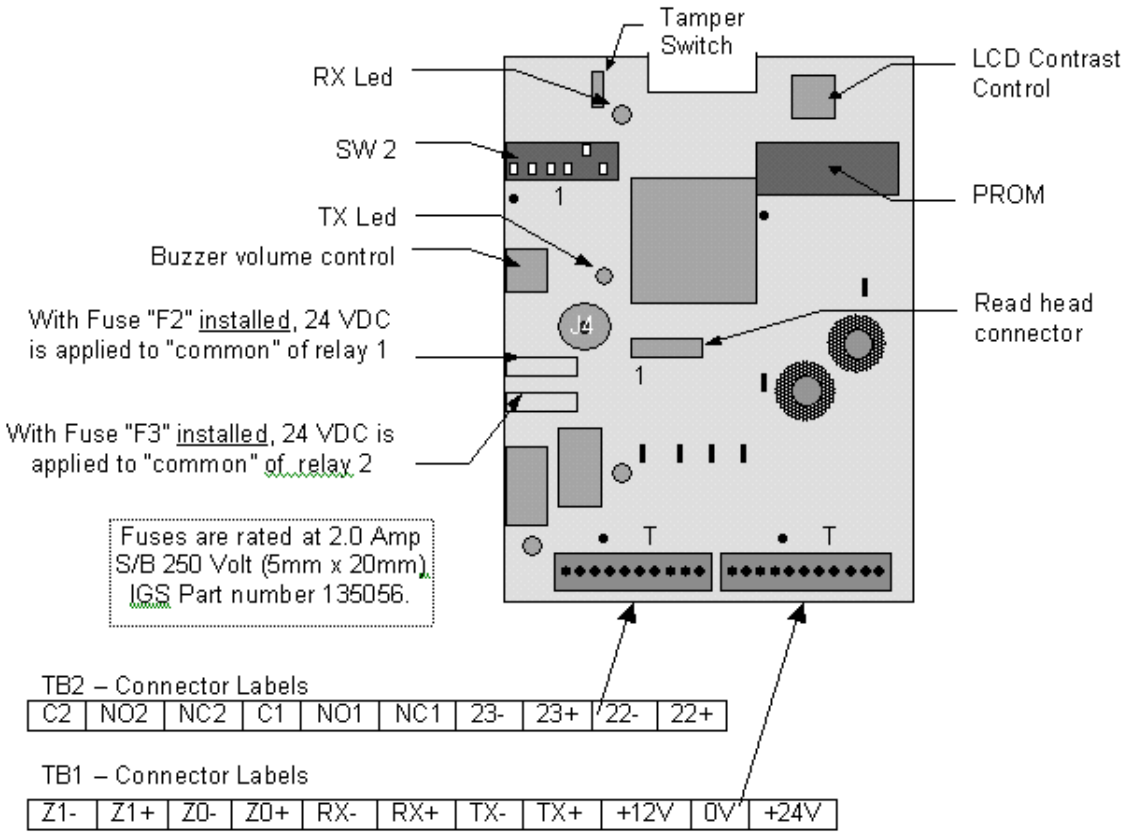

Figure 4-5: Location of Components and Connections on the One-Stage HP Reader

Jumper Settings on a One-Stage HP Reader

The 6 jumpers located on the One-Stage HP Reader (see Figure 4-4). Table 4-18 defines the function of the jumpers.

Jumper	Up (1&2) = Terminated Down (2&3)= Not Terminated
W2	RS-485 Transmit
W3	RS-485 Receive
W4	Terminates Zone Input Z0 with a 1k ohm resistor.
W5	Terminates Zone Input Z1 with a 1k ohm resistor. *
W6	Terminates Zone Input Z2 with a 1k ohm resistor.
W7	Terminates Zone Input Z3 with a 1k ohm resistor.

Table 4-18: One-Stage HP Reader Jumper Settings

* If the Exit Push Button is not connected, then another 1k resistor must be installed across Zone Input Z1.

Alarm Zone Assignments One-Stage Reader

Reader Physical Zones	Z0*	Z1*	Z2	Z3
Reader 0	16	17	18	19
Reader 1	20	21	22	23
Reader 2	24	25	26	27
Reader 3	28	29	30	31
Reader 4	32	33	34	35
Reader 5	36	37	38	39
Reader 6	40	41	42	43
Reader 7	44	45	46	47
Following Readers on ACU-2/16 Only				
Reader 8	128	129	130	131
Reader 9	144	145	146	147
Reader 10	160	161	162	163
Reader 11	176	177	178	179
Reader 12	192	193	194	195
Reader 13	208	209	210	211
Reader 14	224	225	226	227
Reader 15	240	241	242	243

Table 4-19: One-Stage Reader Alarm Numbers for Host PC

NOTE:

* Defaults: Z0: Door Contact

Z1: Exit Push Button

If Z0 and Z1 are used for Door Contact and Exit Push Button sensors, then the alarm numbers in these columns are used to report a trouble condition at the sensor.

Logical Alarm Zones	Door Forced Open	Door Held Open	Reader Tamper	Reader Off-line
Reader 0	64	65	66	67
Reader 1	68	69	70	71
Reader 2	72	73	74	75
Reader 3	76	77	78	79
Reader 4	80	81	82	83
Reader 5	84	85	86	87
Reader 6	88	89	90	91
Reader 7	92	93	94	95
Following Readers on ACU-2/16 Only				
Reader 8	96	97	98	99
Reader 9	100	101	102	103
Reader 10	104	105	106	107
Reader 11	108	109	110	111
Reader 12	112	113	114	115
Reader 13	116	117	118	119
Reader 14	120	121	122	123
Reader 15	124	125	126	127

Table 4-20: One-Stage Reader Logical Alarm Numbers for Host PC

One-Stage Reader Relay Assignments

DIAMOND Version 8.10.xx and Older

Reader	Relay
Reader 0 Door Strike Output Reader 0 Aux Relay	17* 17
Reader 1 Door Strike Output Reader 1 Aux Relay	19* 19
Reader 2 Door Strike Output Reader 2 Aux Relay	21* 21
Reader 3 Door Strike Output Reader 3 Aux Relay	23* 23
Reader 4 Door Strike Output Reader 4 Aux Relay	25* 25
Reader 5 Door Strike Output Reader 5 Aux Relay	27* 27
Reader 6 Door Strike Output Reader 6 Aux Relay	29* 29
Reader 7 Door Strike Output Reader 7 Aux Relay	31* 31
DIAMOND Version 8.10.xx and older does not support ACU2/16 controllers	

DIAMOND Version 8.11.xx and Newer Systems

Reader	DIAMOND
Reader 0 Door Strike Output Reader 0 Aux Relay	16* 17
Reader 1 Door Strike Output Reader 1 Aux Relay	18* 19
Reader 2 Door Strike Output Reader 2 Aux Relay	20* 21
Reader 3 Door Strike Output Reader 3 Aux Relay	22* 23
Reader 4 Door Strike Output Reader 4 Aux Relay	24* 25
Reader 5 Door Strike Output Reader 5 Aux Relay	26* 27
Reader 6 Door Strike Output Reader 6 Aux Relay	28* 29
Reader 7 Door Strike Output Reader 7 Aux Relay	30* 31
Following Readers on ACU2/16 Only	
Reader 8 Door Strike Output Reader 8 Aux Relay	32* 33
Reader 9 Door Strike Output Reader 9 Aux Relay	34* 35
Reader 10 Door Strike Output Reader 10 Aux Relay	36* 37
Reader 11 Door Strike Output Reader 11 Aux Relay	38* 39
Reader 12 Door Strike Output Reader 12 Aux Relay	40* 41
Reader 13 Door Strike Output Reader 13 Aux Relay	42* 43
Reader 14 Door Strike Output Reader 14 Aux Relay	44* 45
Reader 15 Door Strike Output Reader 15 Aux Relay	46* 47

* To use the Reader's Door Strike relay instead of the ACU controller's relay

Table 4-21: RRE Relay Numbers

LCD Display Contrast Adjustment

The LCD contrast has been adjusted at the factory. The following steps will aid the user if an adjustment change is desired.

1. Remove the One-Stage Reader from the mounting plate.
2. Access and adjust the Contrast Control (See Figure 4-4 or Figure 4-5) on the One-Stage Reader for the desired LCD contrast.
3. Reinstall the One-Stage Reader.

Buzzer Volume Adjustment

The Buzzer Volume has been adjusted at the factory. The following steps will aid the user if an adjustment change is desired.

1. Remove the One-Stage Reader from the mounting plate.
2. Access and adjust the Buzzer Volume Control (See Figure 4-5) on the One-Stage HP Reader for the desired loudness.
3. Reinstall the One-Stage Reader.

Reader Condition

Each one-stage reader has three LED indicators and a buzzer that provides Reader status. The table below interprets the different light combinations to the Reader's condition.

State	Red	Yellow	Green	Beep
Online	On	Dim Flash	Off	None
Off-Line	Off	Dim Flash	Dim Flash	None
Access Grant	Off	Dim Flash	Flashes	One 2-Second Beep
Door Unlocked	Off	Dim Flash	ON	None
Access Denied	Off	Dim Flash	Off	Three 1/2-Second Beeps
Not Configured	Off	Dim Flash	Off	None
Door In Alarm	Bright Flash	Bright Flash	Bright Flash	Interrupted Beep
Door In alarm (Masked)	Bright Flash	Bright Flash	Bright Flash	None
Enter Keypad	Off	Bright Flash	Off	None
Key Pressed	Flash	Bright Flash	Flash	When Keypad Pressed
Second Card	Bright Flash	Dim Flash	Off	None
Area Secure	On	Dim Flash	Off	One-4-Second Beep
Area Unsecured	Off	Dim Flash	On	Two 2-Second Beeps
Power-Up	All Off Green On Yellow On if RAM OK Red On if PROM OK Pause one second, then yellow heartbeat (Dim Flash)			

Table 4-22: One-Stage Reader LED/Beeper Usage

Paired Reader Operation

Readers on the same ACU controller can be configured as paired readers. The configuration allows readers to operate as 'in' and 'out' readers for a single door with or without exit push button. Mode changes for paired readers will affect both readers. Commands sent to the first reader of the pair are accepted. Commands sent to the second reader of a pair are ignored.

Paired readers share a single door contact.

The door contact is wired to the first reader of the pair. Unused input zones can be used for more alarms or terminated with a resistor (see Table 4-14 and Table 4-15).

The Door Strike relays can be configured to operate a single relay (for a door) or separately (for a turn-stile).

Keypad Access Request

The One-Stage Reader can be configured from the host computer to allow a card number to be entered from the keypad as well as accept card swipes. The number of digits to be entered is configurable from 1 to 9 digits.

The card number entered from the keypad is processed like a card swipe access request (except there is no test for issue code) with or without an additional PIN keypad number. Digits are entered until the count is reached or the '*' is entered. The '#' key clears currently entered digits.

IKE Integrated Keypad Electronics

The IKE devices are intelligent readers designed for enhanced keypad masking applications. (part number IKE-00RDIGW) The unit can be mounted alone or interface with a separate read head. This keypad has the following features:

- Four supervised zones,
- Red, Yellow, and Green status LEDs
- Alarm Buzzer
- 12 or 16 button key pad
- Built-in Zone termination
  Optional LCD Display
- Available +12 VDC power.
- 2 relay outputs; 2 Amps at 30 VDC rating
- Built-in RS-485 termination
- Internal Tamper switch
- Metal Housing

Component Location IKE Keypad

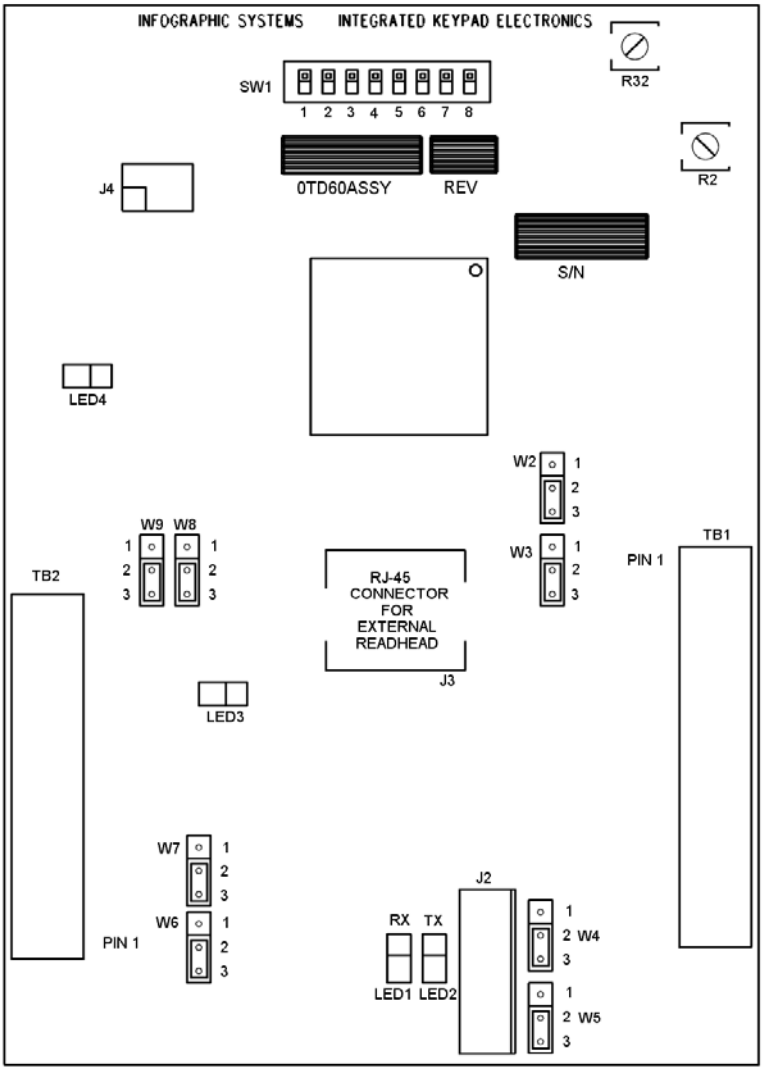

Figure 4-6: IKE Keypad Component Layout

Terminal Block Connections for the IKE Keypad

Wiring Connections IKE Keypad to ACU. *(TB1) Readers 0 – 3 and 8 – 12*

IKE TB1	Description	ACU connector TB2 (Red)	Cable Color (Filled by Installer)
1	+ 24 Volts In	ACU TB2-7 (+24V)	
2	Ground	ACU TB2-8 (0V)	
3	+12 V	+12 VDC 0.4 A max	
4	RS-485 Data TX (+)	ACU TB2-9 (R1T+)	
5	RS-485 Data TX (-)	ACU TB2-10 (R1T-)	
6	RS-485 Data RX(+)	ACU TB2-11 (R1R+)	
7	RS-485 Data RX (-)	ACU TB2-12 (R1R-)	
8	Z0+		
9	Z0-		
10	Z1+		
11	Z1-		

Table 4-23: Wiring Connections IKE Keypad to ACU *Readers 0–3 and 8–12*

Wiring Connections IKE Keypad to ACU. *(TB1) Readers 4-7 and 13–15*

IKE TB1	Description	ACU connector TB2 (Red)	Cable Color (Filled by Installer)
1	+ 24 Volts In	ACU TB2-1 (+24V)	
2	Ground	ACU TB2-2 (0V)	
3	+12 V	+12 VDC 0.4 A max	
4	RS-485 Data TX (+)	ACU TB2-3 (R2T+)	
5	RS-485 Data TX (-)	ACU TB2-4 (R2T-)	
6	RS-485 Data RX(+)	ACU TB2-5 (R2R+)	
7	RS-485 Data RX (-)	ACU TB2-6 (R2R-)	
8	Z2+		
9	Z2-		
10	Z3+		
11	Z3-		

Table 4-24: Wiring Connections IKE Keypad to ACU *Readers 4-7 and 13–15*

Wiring Connections for IKE Keypad. *(TB2)*

IKE TB2	IKE TB2 Descriptions		Cable Color (Filled by Installer)
1	Z2+	Zone 2 + Input	
2	Z2-	Zone 2 + Input	
3	Z3+	Zone 3 – Input	
4	Z3-	Zone 3 – Input	
5	NC1	Relay One, Normally Closed	
6	NO1	Relay One, Normally Open	
7	C1	Relay One, Common	
8	NC2	Relay Two, Normally Closed	
9	NO2	Relay Two, Normally Open	
10	C2	Relay Two, Common	

Table 4-25: Wiring Connections for IKE Keypad TB2

RJ-45 Cable From RMS-10 read-head

Pin out See notes	Function
1	0 V
2	RCL
3	RDA
4	+ 5 V
5	Green LED
6	Yellow LED
7	Red LED
8	FR GRND

Table 4-26: RJ-45 Cable From RMS-10 read-head

Jumper Configurations on IKE Keypad

Jumpers	Positions:	Description
W1	Not Present	Factory use only
W2	(1&2) RS-485 Receive Data.	Terminated
	(2&3) RS-485 Receive Data. *	Not Terminated
W3	(1&2) RS-485 Transmit Data.	Terminated
	(2&3) RS-485 Transmit Data. *	Not Terminated
W4	Zone 0 with 1K ohm	Terminated
	Zone 0, Open. *	Not Terminated
W5	Zone 1 with 1K ohm	Terminated
	Zone 1, Open. *	Not Terminated
W6	Zone 2 with 1K ohm	Terminated
	Zone 2, Open. *	Not Terminated
W7	Zone 3 with 1K ohm	Terminated
	Zone 3, Open. *	Not Terminated
W8	(1&2) places 24V DC on relay common.	See Note Below
	(2&3) relay common is open. *	
W9	(1&2) places 24V DC on relay common.	See Note Below
	(2&3) relay common is open. *	

Table 4-27: IKE Keypad Jumper Configurations

* = Default setting.

NOTE: The 24Volts DC on each relay is limited to 0.5 Amps.

DIP Switch Settings IKE Keypad

Reader Number	Reader Address	Reader Port	S1	S2	S3
0	0	1	OFF	OFF	OFF
1	1	1	ON	OFF	OFF
2	2	1	OFF	ON	OFF
3	3	1	ON	ON	OFF
4	0	2	OFF	OFF	OFF
5	1	2	ON	OFF	OFF
6	2	2	OFF	ON	OFF
7	3	2	ON	ON	OFF
*8	4	1	OFF	OFF	ON
*9	5	1	ON	OFF	ON
*10	6	1	OFF	ON	ON
*11	7	1	ON	ON	ON
*12	4	2	OFF	OFF	ON
*13	5	2	ON	OFF	ON
*14	6	2	OFF	ON	ON
*15	7	2	ON	ON	ON

Table 4-28: Switch SW1 Reader Address Settings

* Used with ACU2/16 Option ONLY (See Figure 3-20)

Read Head Technology	S4	S5
Magstripe Track 2 or 3	OFF	OFF
Magstripe with Wiegand Input Signaling	ON	OFF
Wiegand	OFF	ON
Magstripe Track 1 Format	ON	ON

Table 4-29: Switch SW1 Reader Technology Settings

SW1-S6	Spare (Not Used)
SW1-S7	Spare (Not Used)
SW1-S8 Zone Termination	OFF = Special Customer Configuration
	ON = Special Customer Configuration

Table 4-30: SW1 Zone Termination Settings

Chapter 5

Remote Reader Electronics

RRE, RRE-HP

The Remote Reader Electronics or RRE, (Table 5-10) provides the electronic interface between the ACU controller and the card read head. One or Two RRE's may be installed within a tampered enclosure or separate enclosure. The RRE provides the card read head communication interface as well as four supervised alarm inputs for door contact, request-to-exit and two general-purpose alarms. The RRE also provides two Single Pole Double Throw relays. One relay can be used for door strike. The other relay can be used for remote control functions. The surface mount RRE-1 (part number RRE01-E00) is shown in Figure 5-1. The RRE and the RRE HP are identical in wiring and functionality. The surface mount RRE and RRE HP have additional transient protection, but the RRE HP is physically larger. See UL Specification's Section for additional information.

During reader installation, refer to the manufactures instructions shipped with the reader for the latest installation information.

NOTE: See Table A-13 for complete list of reader product numbers.

RRE Surface Mount Board

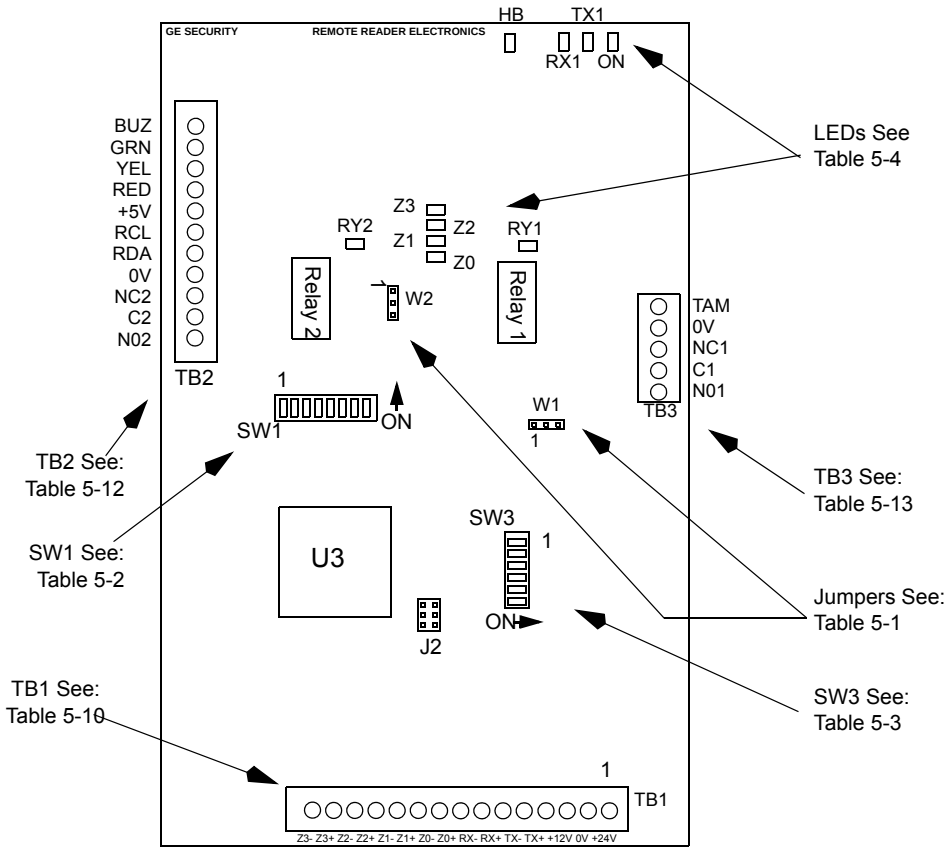

Figure 5-1: Location of Components on Surface Mount RRE

RRE Surface Mount Jumper Settings.

Jumper Location	Jumper	Action
Relay 1 (Door Strike)		
W1	1 and 2	Strike Relay Wet (24 VDC)
W1	*2 and 3	Strike Relay Dry
Relay 2 (Aux)		
W2	1 and 2	Aux Relay Wet (24 VDC)
W2	*2 and 3	Aux Relay Dry

Table 5-1: RRE Surface Mount Jumper Settings

* Factory default

RRE Surface Mount DIP SW1 Switch Settings

SW1-1	SW1-2	SW1-3	Reader Address
Off	Off	Off	Address 0
On	Off	Off	Address 1
Off	On	Off	Address 2
On	On	Off	Address 3
Off	Off	On	Address 4
On	Off	On	Address 5
Off	On	On	Address 6
On	On	On	Address 7
SW1-4	**SW1-5**	**SW1-6**	**Read Head**
Off	Off	Off	Magnetic stripe
On	Off	Off	Magnetic Format on Wiegand
Off	On	Off	Wiegand
On	On	Off	Track 1 ABA
Off	Off	On	RS 485 (not implemented)
SW1-7	**SW1-8**		**Alarm Termination**
Off	Off		0.5K alarm, 1K secure, 2K alarm
On	Off		1K safe; 3K alarm
Off	On		1K safe, 3K alarm, 5K Ground, 7K Ground
On	On		6.8K safe, 24.8K alarm

Table 5-2: RRE Surface Mount DIP SW1 Switch Settings

RRE Surface Mount DIP SW3 Switch Settings

SW3	Termination
1	ON = TX Reader Comm Termination (com ACU to RRE)
2	ON = RX Reader Comm Termination (com ACU to RRE)
3	ON = Internally Terminate Zone 3 with 1 K ohm, OFF = Do not terminated
4	ON = Internally Terminate Zone 2 with 1 K ohm, OFF = Do not terminated
5	ON = Internally Terminate Zone 1 with 1 K ohm, OFF = Do not terminated
6	ON = Internally Terminate Zone 0 with 1 K ohm, OFF = Do not terminated

Table 5-3: RRE Surface Mount DIP Switch SW3 settings

LEDs RRE Surface Mount Board

	ON = Alarm, Flashing = Trouble, OFF = Alarm Secure unless stated otherwise
Z0	Zone 0 – Door Contact
Z1	Zone 1 – Rex to Exit
Z2	Zone 2 – Bond Sensor or Aux input 1
Z3	Zone 3 – Aux input 2
D17	ON – Aux Relay Activated
D18	ON – Door Strike Relay Activated
HB	Flashing once per second indicates CPU is up and running.
RX1	Flashing means RRE is receiving reader comm. data
TX1	Flashing means RRE is transmitting reader comm. data
ON	RRE has power

Table 5-4: LEDs for Surface Mount RRE

RRE Circuit Board

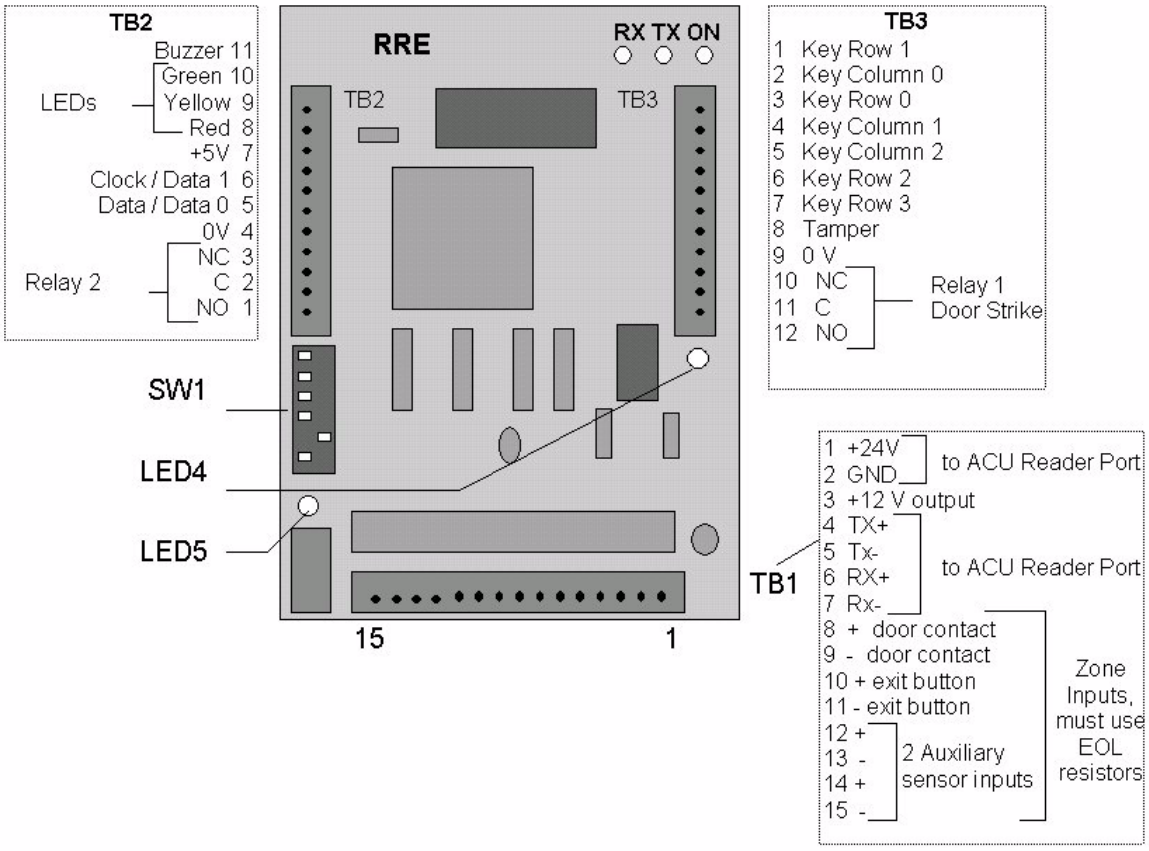

Figure 5-2: RRE Circuit Board Component Locations

Setting the DIP SW1 Switches on the RRE

The 6-position DIP switch (SW1) located on the RRE (Figure 5-1 and Figure 5-2) should be set according to Table 5-2.

NOTE: The switches are read at power-up (or reset) and will be ignored thereafter. If it is necessary to change a setting, power MUST be cycled OFF then, AFTER the setting is changed, ON.

RRE DIP SW1 Switch Settings

Switch	SW1	SW2	SW3	Address
Switches 1, 2 & 3 Communication Address:	OFF	OFF	OFF	0
	ON	OFF	OFF	1
	OFF	ON	OFF	2
	ON	ON	OFF	3
	OFF	OFF	ON	*4
	ON	OFF	ON	*5
	OFF	ON	ON	*6
	ON	ON	ON	*7

Switches 4 & 5 Reader support	SW4	SW5	
	OFF	OFF	Magnetic stripe on Track 2 or 3
	OFF	ON	Wiegand
	ON	OFF	Magnetic format on Wiegand input
	ON	ON	Magnetic on Track 1
Switch 6	Spare		

* Used with ACU2/16 option ONLY

Table 5-5: RRE DIP Switch Settings

NOTE: Previous to PROM Revision “ARDR8N”, Switch 3 was used to set the type of alarm termination.

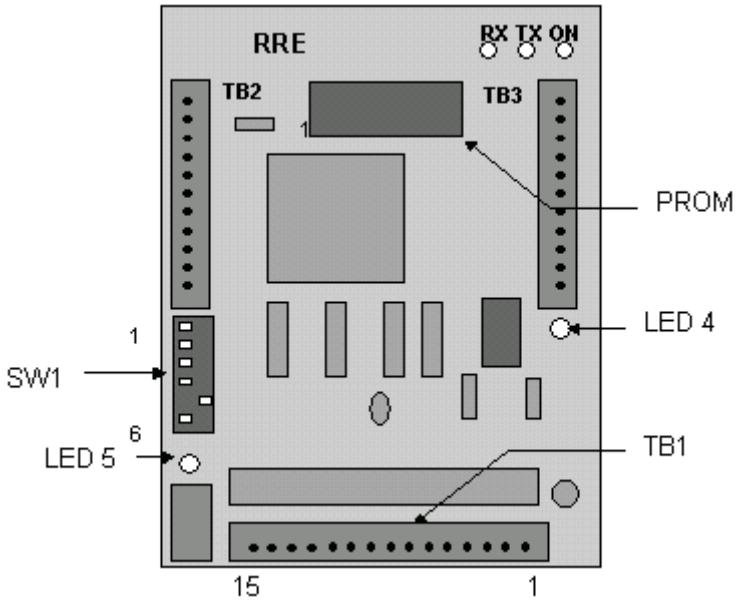

Figure 5-3: Location of Components on the RRE

RRE-HP Jumpers Settings

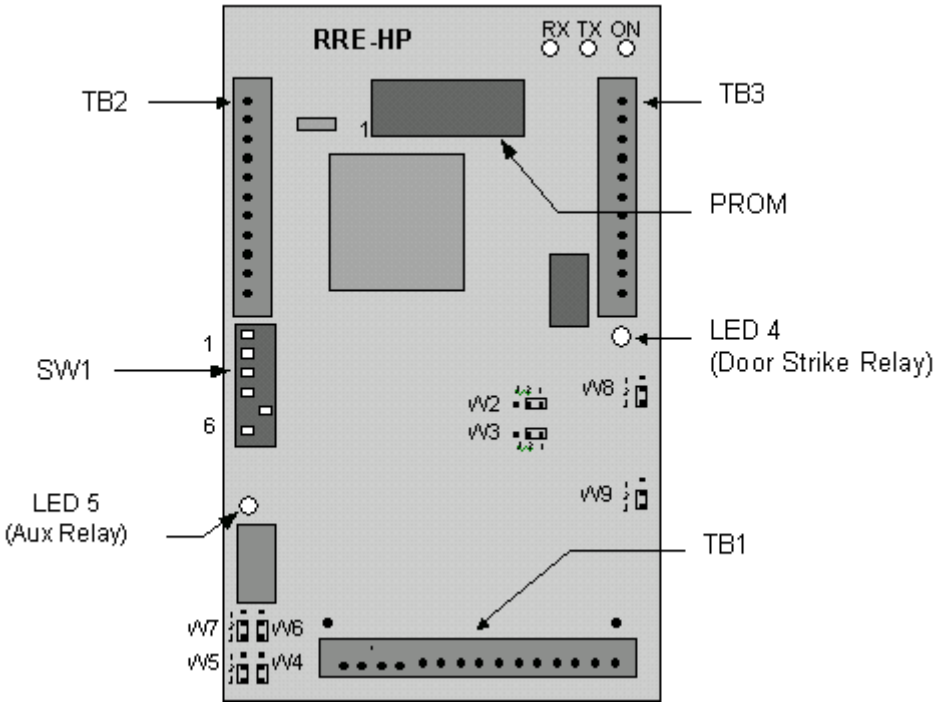

Figure 5-4: Location of Components on the RRE HP.

The 8 jumpers located on the RRE HP (see Figure 5-4). Table 5-6 and Table 5-7 defines the function of the jumpers.

Jumper Location	(1&2) = Terminated (2&3)= Not Terminated
W2	RS-485 Transmit
W3	RS-485 Receive
W4	Terminates Zone Input Z0 with a 1k ohm resistor.
W5	Terminates Zone Input Z1 with a 1k ohm resistor. *
W6	Terminates Zone Input Z2 with a 1k ohm resistor.
W7	Terminates Zone Input Z3 with a 1k ohm resistor.

* If the Exit Push Button is not connected, then another 1k resistor must be installed across Zone Input Z1

Table 5-6: RRE HP Jumper Settings.

Jumper Location	Jumper	Action
W8	1 and 2	Strike Relay Wet (24 VDC)
W8	*2 and 3	Strike Relay Dry
W9	1 and 2	Aux Relay Wet (24 VDC)
W9	*2 and 3	Aux Relay Dry

* Factory default

Table 5-7: RRE HP Jumper Settings

RRE Alarm Zone Assignments

Reader Physical Zones	Z0*	Z1*	Z2	Z3
Reader 0	16	17	18	19
Reader 1	20	21	22	23
Reader 2	24	25	26	27
Reader 3	28	29	30	31
Reader 4	32	33	34	35
Reader 5	36	37	38	39
Reader 6	40	41	42	43
Reader 7	44	45	46	47

Table 5-8: RRE Alarm Numbers for the Host PC

* Defaults: Z0: Door Contact

Z1: Exit Push Button

NOTE: If Z0 and Z1 are used for Door Contact and Exit Push Button then the alarm numbers in these columns are used to report a trouble condition at the sensor.

Relay Assignments

DIAMOND Version 8.10 and Older

Reader	
Reader 0 Door Strike Output Reader 0 Aux Relay	17* 17
Reader 1 Door Strike Output Reader 1 Aux Relay	19* 19
Reader 2 Door Strike Output Reader 2 Aux Relay	21* 21
Reader 3 Door Strike Output Reader 3 Aux Relay	23* 23
Reader 4 Door Strike Output Reader 4 Aux Relay	25* 25
Reader 5 Door Strike Output Reader 5 Aux Relay	27* 27
Reader 6 Door Strike Output Reader 6 Aux Relay	29* 29
Reader 7 Door Strike Output Reader 7 Aux Relay	31* 31

DIAMOND Version 8.11 and Newer

Reader	
Reader 0 Door Strike Output Reader 0 Aux Relay	16* 17
Reader 1 Door Strike Output Reader 1 Aux Relay	18* 19
Reader 2 Door Strike Output Reader 2 Aux Relay	20* 21
Reader 3 Door Strike Output Reader 3 Aux Relay	22* 23
Reader 4 Door Strike Output Reader 4 Aux Relay	24* 25
Reader 5 Door Strike Output Reader 5 Aux Relay	26* 27
Reader 6 Door Strike Output Reader 6 Aux Relay	28* 29
Reader 7 Door Strike Output Reader 7 Aux Relay	30* 31

* To use the Reader's Door Strike relay instead of the ACU controller's relay

Table 5-9: RRE Relay Numbers

Terminal Block Connector PIN Numbers on the RRE and Surface Mount

Table 5-10 though Table 5-13 show RRE terminal block wiring connections. Refer to Chapter 3, Table 3-49 for applicable ACU controller connections and cable identifications.

RRE TB1 Wiring Connections - Readers 0 Through 3

Pin No.	Term. Strip	Description	Reader Terminal TB1. Connected to:	Cable Color (Filled in by Installer)
1	+24V	+ 24 Volts In	ACU TB2-7 (+24V)	
2	0V	Ground	ACU TB2-8 (0V)	
3	+12V	+12 VDC 0.4 A max.		
4	TX+	From ACU Expansion Port TX (+)	ACU TB2-9 (R1T+)	
5	TX-	From ACU Expansion Port TX (-)	ACU TB2-10 (R1T-)	
6	RX+	From ACU Expansion Port RX(+)	ACU TB2-11 (R1R+)	
7	RX-	From ACU Expansion Port RX (-)	ACU TB2-12 (R1R-)	
8	Z0+	Zone Input 0 (+) Door Contact	Door Contact	
9	Z0-	Zone Input 0 (-)	Door Contact	
10	Z1+	Zone Input 1 (+) REX	Exit Push Button	
11	Z1-	Zone Input 1 (-)	Exit Push Button	
12	Z2+	Zone Input 2 (+) - Aux. Input 1		
13	Z2-	Zone Input 2 (-) - Aux. Input 1		
14	Z3+	Zone Input 3 (+) - Aux. Input 2		
15	Z3-	Zone Input 3 (-) - Aux. Input 2		

Table 5-10: RRE TB1 Wiring Connections - Readers 0 Through 3

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NOTES:

- Each ACU controller has 2 reader ports. Four readers may be multi-dropped on each port along with Remote Relay Modules (RRM16-E1L) and Remote Input Modules (RIM16-E1L).
- Install RS-485 termination at the end of the longest reader cable.
- **Readers should be Multi-dropped with no longer than a 10 ft. stub to the reader**.
- Belden Cable No. 9409-18 suggested for door strikes.
- Belden Cable No. 9407-22 AWG suggested for zone sensors.
- Terminating any unused zone inputs.

RRE TB1 Wiring Connections - Readers 4 Through 7

Pin No.	Term. Strip	Description	Reader Terminal TB1. Connected to:	Cable Color (Filled in by Installer)
1	+24V	+ 24 Volts In	ACU TB2-1 (+24V)	
2	0V	Ground	ACU TB2-2 (0V)	
3	12V	+12 VDC 0.4 A max.		
4	TX+	From ACU TX (+)	ACU TB2-3 (R2T+)	
5	TX-	From ACU TX (-)	ACU TB2-4 (R2T-)	
6	RX+	From ACU RX(+)	ACU TB2-5 (R2R+)	
7	RX-	From ACU RX (-)	ACU TB2-6 (R2R-)	
8	Z0+	Zone Input 0 (+)	Door Contact	
9	Z0-	Zone Input 0 (-)	Door Contact	
10	Z1+	Zone Input 1 (+)	Exit Push Button	
11	Z1-	Zone Input 1 (-)	Exit Push Button	
12	Z2+	Zone Input 2 (+) - Aux Input 1		
13	Z2-	Zone Input 2 (-) - Aux Input 1		
14	Z3+	Zone Input 3 (+) - Aux Input 2		
15	Z3-	Zone Input 3 (-) - Aux Input 2		

Table 5-11: RRE TB1 Wiring Connections - Readers 4 Through 7

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NOTES:

- Each ACU controller has 2 module ports. Four readers may be multi-drop on each port along with Remote Relay Modules (RRM16-E1L) and Remote Input Modules (RIM16-E1L)
- Belden Cable numbers suggested:
- No. 9329-22 AWG for 1000 ft. (305 m) max distance.
- No. 9369-18 AWG for 4000 ft. (1220 m) max distance.
- Two RS-485 Terminators are supplied with each ACU controller.
- Install RS-485 termination at the end of the longest reader cable.
- RS-485 terminator is part number ACU-EOLRS.
- **Readers should be Multi-dropped with no longer than a 10 ft. stub to the reader**.
- Belden Cable No. 9409-18 suggested for door strikes.
- Belden Cable No. 9407-22 AWG suggested for zone sensors.
- Terminate any unused zone inputs.

RRE TB2 Wiring Connections

Pin No.	Term. Strip	Description	Connected to: (Filled in by Installer)	Cable Color (Filled in by Installer)
11	BUZ	Buzzer (active low)		
10	GRN	Green LED (active low)		
9	YEL	Yellow LED (active low)		
8	RED	Red LED (active low)		
7	+5V	+5 Volt output @ 300 mA		
6	RCL	Data 1 or Mag Clock		
5	RDA	Data 0 or Mag Data		
4	0V	Ground		
3	NC2	Aux Relay Normally Closed.		
2	C2	Aux Relay Common		
1	NO2	Aux Relay Normally Open		

Table 5-12: RRE TB-2 Wiring Connections

RRE TB3 Wiring Connections

Pin No.	Term. Strip	Description	Connected to: (Filled in by Installer)	Cable Color (Filled in by Installer)
1	KR1	[1]External Keypad Row 1		
2	KC0	[1]External Keypad Column 0		
3	KR0	[1]External Keypad Row 0		
4	KC1	[1]External Keypad Column 1		
5	KC2	[1]External Keypad Column 2		
6	KR2	[1]External Keypad Row 2		
7	KR3	[1]External Keypad Row 3		
8	TAM	Tamper Switch		
9	0V	Tamper Switch Common		
10	NC1	[2] Door Strike Relay N.C. *		
11	C1	[2] Door Strike Relay Common. *		
12	NO1	Door Strike Relay Normally Open *		

Table 5-13: RRE TB-3 Wiring Connections

[1] Not included on the RRE Surface Mount version.

[2] Can be configured for door strike output. Default for door strike is on the ACU Controller

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NOTE: Do not use the Remote Reader Electronics (RRE) Relays to switch any voltage above 30 volts.

RRE-2 and RRE-4 Surface Mount (RREs)

RRE-2 Surface Mount

The RRE-2R (part numbers RRE02-E00 AND RRE2-E1L) Surface Mount Remote Reader Electronics (Figure 5-6) provides the electronic interface between the ACU controller and two Wiegand card read heads. The RRE-2 consists of the electronic circuit board, and the screw terminal connector board, connected together by a ribbon cable and is installed within a tampered enclosure. The RRE-2 provides the card read head communication interface as well as eight supervised alarm inputs for door contact, and request-to-exit. Any of the readers on the RRE-2 can be individually deactivated via DIP switch allowing you to also use an RRE01-E1L on the same port. However the rules for the reader port still applies, 4 readers per ACU and 8 readers per ACUXL.

Warning:

Do not use the ACU controller, Remote Reader Electronics (RRE, RRE-2 or RRE-4), Remote Input Module (RIM) or Remote Relay Module (RRM) to switch any voltage above 30 volts. Failure to heed this WARNING: can cause death, personal injury or damage to unit(s).

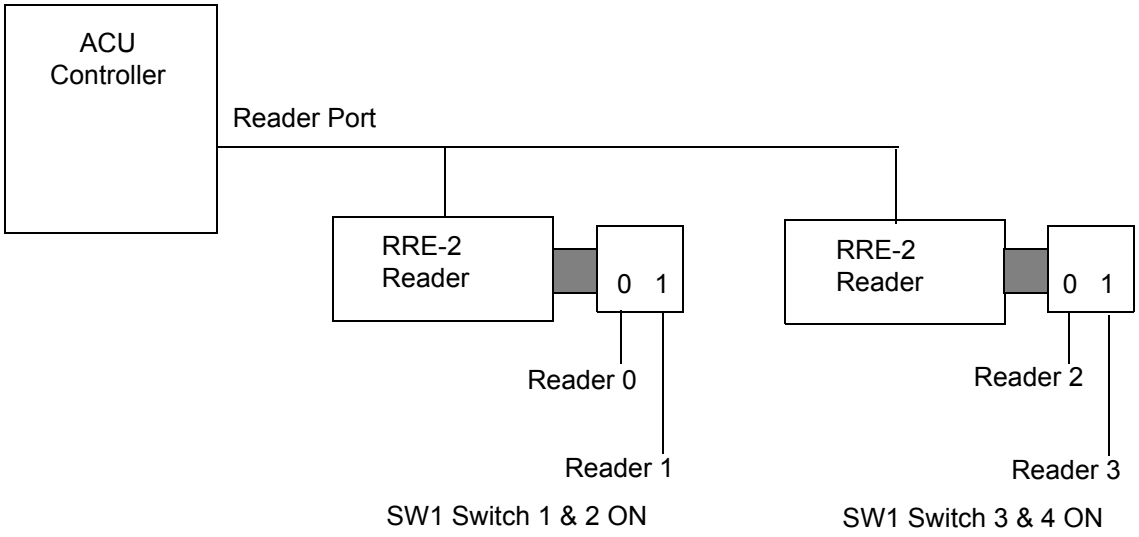

Figure 5-5: Overview for use of more than one Surface Mount RRE-2 on the same port.

RRE-2 Surface Mount Component Layout

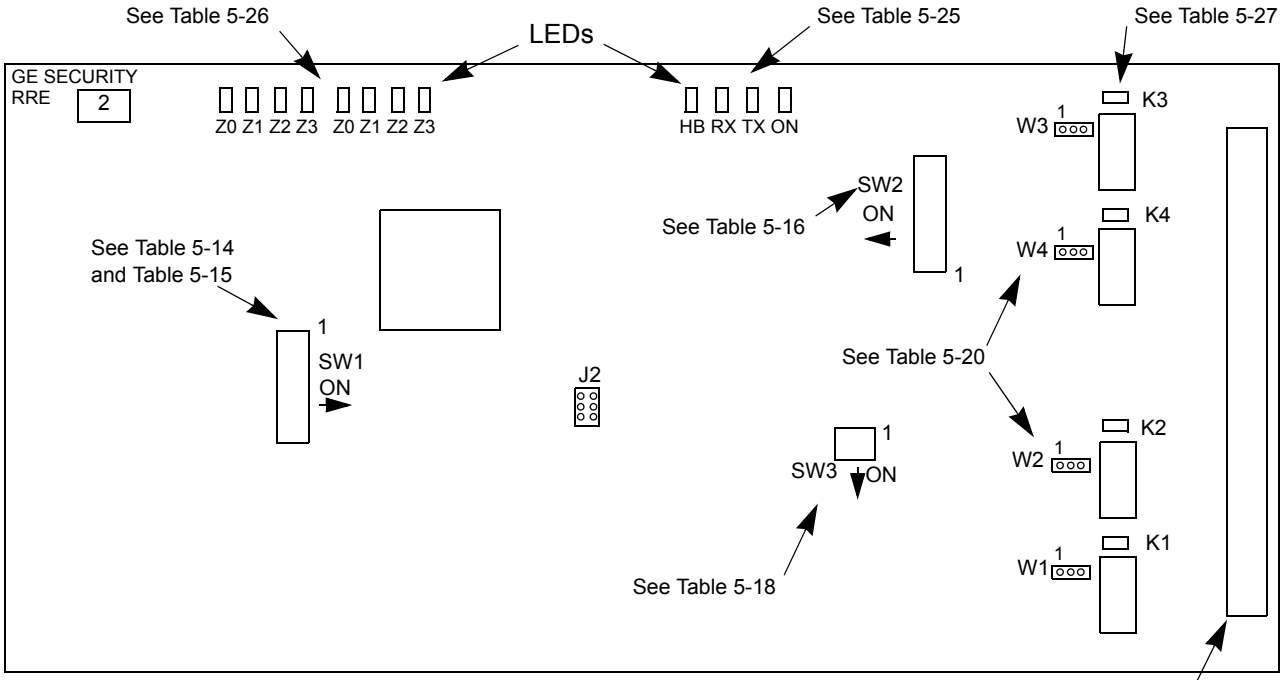

Figure 5-6: RRE-2 Surface Mount Component Layout

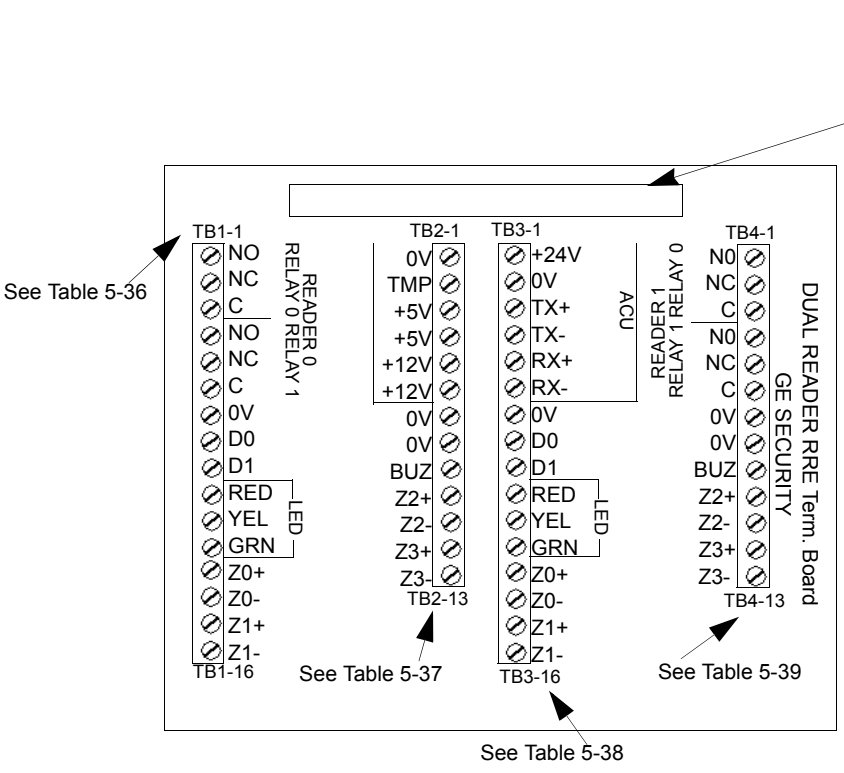

Figure 5-7: PIN Locations on the Terminal Board of the SMT RRE2

RRE-4 Surface Mount

The RRE-4 (part numbers RRE04-E00 and RRE04-E1L) Surface Mount Remote Reader Electronics (Figure 5-9) provides the electronic interface between the ACU controller and two Wiegand card read heads. The RRE-4 consists of the electronic circuit board, and the screw terminal connector board, connected together by a ribbon cable and is installed within a tampered enclosure (part number ACU-ENCRM). The RRE-4 provides the card read head communication interface, eight supervised alarm inputs for door contact, and request-to-exit as well as eight AUX supervised alarm inputs. Any of the readers on the RRE-4 can be individually deactivated via DIP switch allowing you to also use an RRE01-E1L on the same port. However the rules for the reader port still applies, 4 readers per ACU and 8 readers per ACUXL.

Warning:

Do not use the ACU controller, Remote Reader Electronics RRE, RRE-2 or RRE-4), Remote Input Module (RIM) or Remote Relay Module (RRM) to switch any voltage above 30 volts. Failure to heed this WARNING: can cause death, personal injury or damage to unit(s).

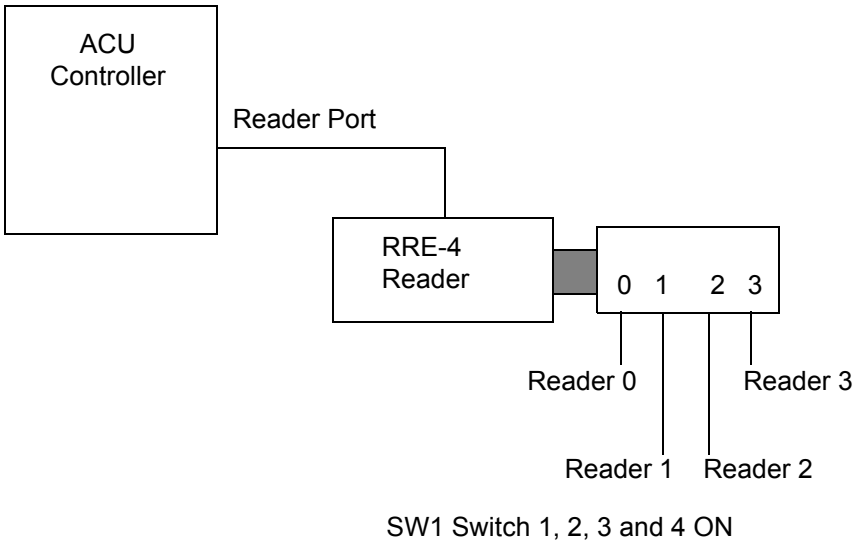

Figure 5-8: Overview for use of one RRE-4 on the ACU port.

RRE-4 Surface Mount Component Layout

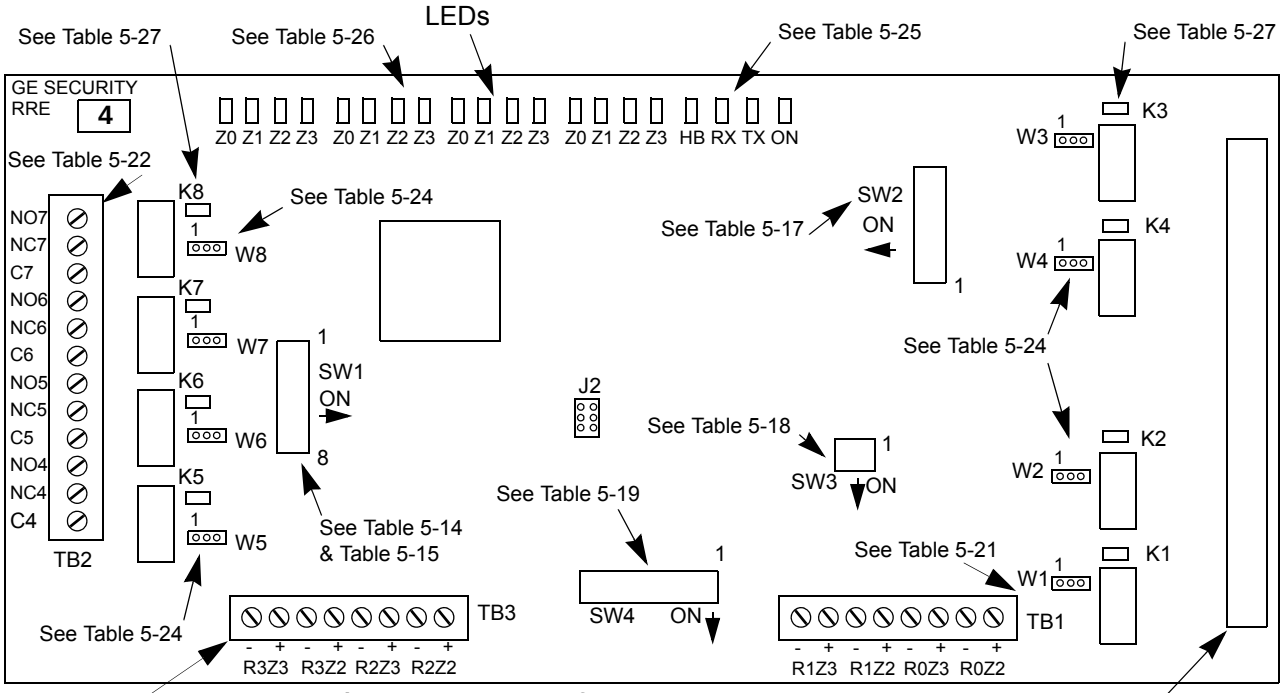

Figure 5-9: RRE-4 Surface Mount Component Layout

Termination Board Ribbon Connector

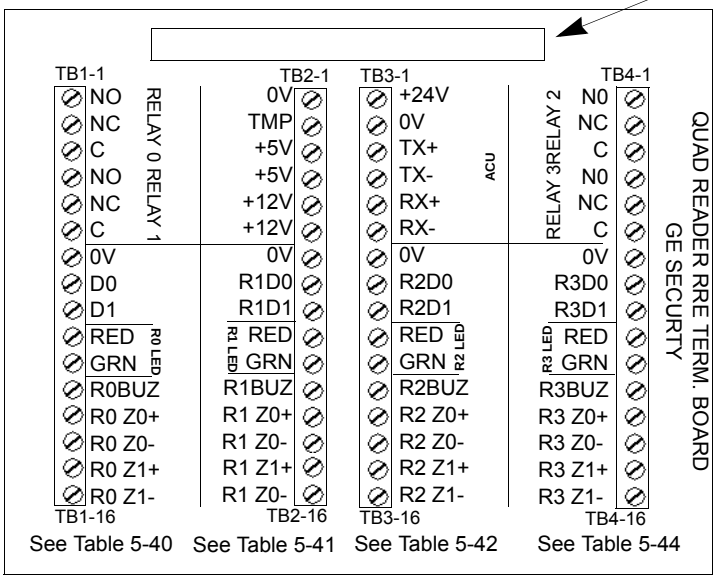

Figure 5-10: PIN Locations on the Terminal Board of the SMT RRE-4

DIP Switch Settings on the RRE-2 and RRE-4 Surface Mount

RRE-2 and RRE-4 DIP Switch SW1 for Reader Activation

The 8-position DIP switch (SW1) located on the RRE-2 (Figure 5-6) and RRE-4 (Figure 5-9) is used to activate a connected reader and should be set according to Table 5-14.

NOTE: The switches are read constantly, any changes will take place immediately.

Switch	Switch	Function
7 OFF	1 ON	Reader address 0 present
7 OFF	2 ON	Reader address 1 present
7 OFF	3 ON	Reader address 2 present
7 OFF	4 ON	Reader address 3 present
7 ON	1 ON	Reader address 4 present
7 ON	2 ON	Reader address 5 present
7 ON	3 ON	Reader address 6 present
7 ON	4 ON	Reader address 7 present

Table 5-14: RRE-2 and RRE-4 Surface Mount DIP Switch SW1 Reader Settings

NOTE: If switches 1-4 are all "Off", the RRE-4 will not communicate to the ACU.

The Surface Mount RRE-2 and RRE-4 can only support lower reader addresses (0-3) or higher reader addresses (4-7) at one time..

SW 5	SW 6	SW 8	Read Head
OFF	OFF	SPARE	Magnetic Stripe
ON	OFF	SPARE	Wiegand
OFF	ON	SPARE	Magnetic Stripe on Wiegand

Table 5-15: RRE-2 and RRE-4 Surface Mount DIP Switch SW1 Reader Type Setting

RRE-2 DIP Switch SW2 Zone Termination

The 8-position DIP switch (SW2) located on the RRE-2 (Figure 5-6) should be set according to Table 5-16.

NOTE: The switches are dynamic. Changes will take effect immediately.

Switch	Function
1 ON	Reader 0, zone 0 Terminated with 1K ohm resistor
2 ON	Reader 0, zone 1 Terminated with 1K ohm resistor
3 ON	Reader 0, zone 2 Terminated with 1K ohm resistor
4 ON	Reader 0, zone 3 Terminated with 1K ohm resistor
5 ON	Reader 1, zone 0 Terminated with 1K ohm resistor
6 ON	Reader 1, zone 1 Terminated with 1K ohm resistor
7 ON	Reader 1, zone 2 Terminated with 1K ohm resistor
8 ON	Reader 1, zone 3 Terminated with 1K ohm resistor

Table 5-16: RRE-2 Surface Mount DIP Switch SW2 Zone Termination Settings

RRE-4 DIP Switch SW2 Zone Termination

The 8-position DIP switch (SW2) located on the RRE4 (Figure 5-9) should be set according to Table 5-17.

NOTE: The switches are dynamic. Changes will take effect immediately.

Switch	Function
1 ON	Reader 0, zone 0 Terminated with 1K ohm resistor
2 ON	Reader 0, zone 1 Terminated with 1K ohm resistor
3 ON	Reader 1, zone 0 Terminated with 1K ohm resistor
4 ON	Reader 1, zone 1 Terminated with 1K ohm resistor
5 ON	Reader 2, zone 0 Terminated with 1K ohm resistor
6 ON	Reader 2, zone 1 Terminated with 1K ohm resistor
7 ON	Reader 3, zone 0 Terminated with 1K ohm resistor
8 ON	Reader 3, zone 1 Terminated with 1K ohm resistor

Table 5-17: RRE-4 Surface Mount DIP Switch SW2 Zone Termination Settings

RRE-2 and RRE-4 DIP Switch SW3 Communications Termination

The 2-position DIP switch (SW3) located on the RRE-2 (Figure 5-6) and RRE-4 (Figure 5-9) should be set according to Table 5-18.

NOTE: The switches are dynamic. Changes will take effect immediately.

Switch	Function
1 ON	TX Reader Communications Terminated
2 ON	RX Reader Communications Terminated

Table 5-18: RRE-2 and RRE-4 Surface Mount DIP Switch SW3 Communications Termination Settings

RRE-4 DIP Switch SW4 Zone Termination (RRE-4 Only)

The 8-position DIP switch (SW4) located on the RRE-4 (Figure 5-9) should be set according to Table 5-19.

NOTE: The switches are dynamic. Changes will take effect immediately.

Switch	Function
1 ON	Reader 0, zone 2 Terminated with 1K ohm resistor
2 ON	Reader 0, zone 3 Terminated with 1K ohm resistor
3 ON	Reader 1, zone 2 Terminated with 1K ohm resistor
4 ON	Reader 1, zone 3 Terminated with 1K ohm resistor
5 ON	Reader 2, zone 2 Terminated with 1K ohm resistor
6 ON	Reader 2, zone 3 Terminated with 1K ohm resistor
7 ON	Reader 3, zone 2 Terminated with 1K ohm resistor
8 ON	Reader 3, zone 3 Terminated with 1K ohm resistor

Table 5-19: RRE-4 Surface Mount DIP Switch SW4 Zone Termination Settings

Jumper W1-W4 on the RRE-2 Surface Mount

Table 5-20 defines the function of the 4 jumpers located on the RRE-2 (Figure 5-6).

Jumper	Pins 1 & 2	Pins 2 & 3 or Jumper Removed
W1	Provides 24vdc for Reader 0 relay **	Dry Contacts*
W2	Provides 24vdc for Reader 0 AUX relay **	Dry Contacts*
W3	Provides 24vdc for Reader 1 relay **	Dry Contacts*
W4	Provides 24vdc for Reader 1 AUX relay **	Dry Contacts*

* Current for each relay contact limited to 2 Amps
** Current for each relay contact limited to .5 Amps

Table 5-20: RRE-2 Surface Mount Settings for Jumpers W1-W4

Connections for RRE-2 Surface Mount Termination Board

All connection are the same as the RRE-2 see (Table 5-36 through Table 5-39).

Connections for RRE-4 Surface Mount Board

Connections for terminal blocks TB1, TB2 and TB3 are located on the Surface Mount RRE-4. See Table 5-21 through Table 5-23 for these connections. TB4 connections are the same as for the standard RRE-4. See Table 5-44.

TB1 Connections Surface Mount RRE-4

PIN Number	PIN Label	Function
1	+ R0Z2	Reader 0 AUX Zone 2
2	- R0Z2	
3	+ R0Z3	Reader 0 AUX Zone 3
4	- R0Z3	
5	+ R1Z2	Reader 1 AUX Zone 2
6	- R1Z2	
7	+ R1Z3	Reader 1 AUX Zone 3
8	- R1Z3	

Table 5-21: RRE-4 Surface Mount TB1 Connections.

TB2 Connections Surface Mount RRE-4

PIN Number	Description	Function
1	C4	AUX Relay 4
2	NC4	
3	NO4	
4	C5	AUX Relay 5
5	NC5	
6	NO5	
7	C6	AUX Relay 6
8	NC6	
9	NO6	
10	C7	AUX Relay 7
11	NC7	
12	NO7	

Table 5-22: RRE-4 Surface Mount TB2 Connections.

TB3 Connections Surface Mount RRE-4

PIN Number	PIN Label	Function
1	+ R2Z2	Reader 2 AUX Zone 2
2	- R2Z2	
3	+ R2Z3	Reader 2 AUX Zone 3
4	- R2Z3	
5	+ R3Z2	Reader 3 AUX Zone 2
6	- R3Z2	
7	+ R3Z3	Reader 3 AUX Zone 3
8	- R3Z3	

Table 5-23: RRE-4 Surface Mount TB3 Connections.

Jumper W1-W8 on the RRE-4 Surface Mount

Table 5-24 defines the function of the 8 jumpers located on the RRE-4 (Figure 5-9).

Jumper	Pins 1 & 2	Pins 2 & 3 or Jumper Removed
W1	Provides 24vdc for Reader 0 relay **	Dry Contacts*
W2	Provides 24vdc for Reader 1 relay **	Dry Contacts*
W3	Provides 24vdc for Reader 2 relay **	Dry Contacts*
W4	Provides 24vdc for Reader 3 relay **	Dry Contacts*
W5	Provides 24vdc for Reader 0 AUX relay **	Dry Contacts*
W6	Provides 24vdc for Reader 1 AUX relay **	Dry Contacts*
W7	Provides 24vdc for Reader 2 AUX relay **	Dry Contacts*
W8	Provides 24vdc for Reader 3 AUX relay **	Dry Contacts*

* Current for each relay contact limited to 2 Amps.

** Current for each relay contact limited to .5 Amps.

Table 5-24: RRE-4 Surface Mount Settings for Jumpers W1-W8.

Status LEDs for RRE-2 and RRE-4 Surface Mount

Table 5-25 defines the function of the Relay LEDs located on RRE-2 (Figure 5-6) and the RRE-4 (Figure 5-9).

LED Designation	Function
ON	Indicates Power Applied to Board
TX	Flashes when Transmitting Data
RX	Flashes when Receiving Data
HB	Heartbeat 1 Hz Flash-CPU is functioning correctly

Table 5-25: RRE-2 and RRE-4 Surface Mount Status LEDs.

Input Zone LEDs for RRE-2 and RRE-4 Surface Mount

Table 5-26 defines the function of the Input zone LEDs located on RRE-2 (Figure 5-6) and the RRE-4 (Figure 5-9).

LED Designation	Off=Secure / On=Alarm / Blink=Trouble
R0 Z0	Reader 0 Zone 0
R0 Z1	Reader 0 Zone 1
R0 Z2	Reader 0 Zone 2
R0 Z3	Reader 0 Zone 3
R1 Z0	Reader 1 Zone 0
R1 Z1	Reader 1 Zone 1
R1 Z2	Reader 1 Zone 2
R1 Z3	Reader 1 Zone 3
R2 Z0	Reader 2 Zone 0 - RRE-4 Only
R2 Z1	Reader 2 Zone 1 - RRE-4 Only
R2 Z2	Reader 2 Zone 2 - RRE-4 Only
R2 Z3	Reader 2 Zone 3 - RRE-4 Only
R3 Z0	Reader 3 Zone 0 - RRE-4 Only
R3 Z1	Reader 3 Zone 1 - RRE-4 Only
R3 Z2	Reader 3 Zone 2 - RRE-4 Only
R3 Z3	Reader 3 Zone 3 - RRE-4 Only

Table 5-26: RRE-4 Surface Mount Settings Input Zone LEDs.

Relay LEDs for RRE-2 and RRE-4 Surface Mount

Table 5-27 defines the function of the Relay LEDs located on RRE-2 (Figure 5-6) and the RRE-4 (Figure 5-9).

LED Designation	RRE-2	RRE-4
D32	Reader 0 Strike (ON=Active)	Reader 0 Strike (ON=Active)
D37	Reader 0 AUX (ON=Active)	Reader 1 Strike (ON=Active)
D46	Reader 1 Strike (ON=Active)	Reader 2 Strike (ON=Active)
D49	Reader 1 AUX (ON=Active)	Reader 3 Strike (ON=Active)
D86	N/A	Reader 0 AUX (ON=Active)
D90	N/A	Reader 1 AUX (ON=Active)
D99	N/A	Reader 2 AUX (ON=Active)
D109	N/A	Reader 3 AUX (ON=Active)

Table 5-27: RRE-2 and RRE-4 Surface Mount Relay LEDs.

RRE-2 and RRE-4

DIP Switch Settings on the RRE-2 and RRE-4

The 6-position DIP switch (SW1) located on the RRE-2 (Figure 5-11) and RRE-4 (Figure 5-12) should be set according to Table 5-28.

NOTE: The switches are read constantly, any changes will take place immediately.

Switch	Function
Switch 1 – 1st Reader	ON – Reader present OFF – Reader not present Note: For RRE-2 use 1st and 2nd or 3rd and 4th readers only!
Switch 2 – 2nd Reader	
Switch 3 – 3rd Reader	
Switch 4 – 4th Reader	
Switch 5 – Reader Type	OFF = Magnetic ON = Wiegand or Proximity
Switch 6	Spare

Table 5-28: RRE-2 and RRE-4 DIP Switch Settings

NOTE: If switches 1-4 are all "Off", the RRE-4 will not communicate to the ACU.

RRE-2 Component Layout

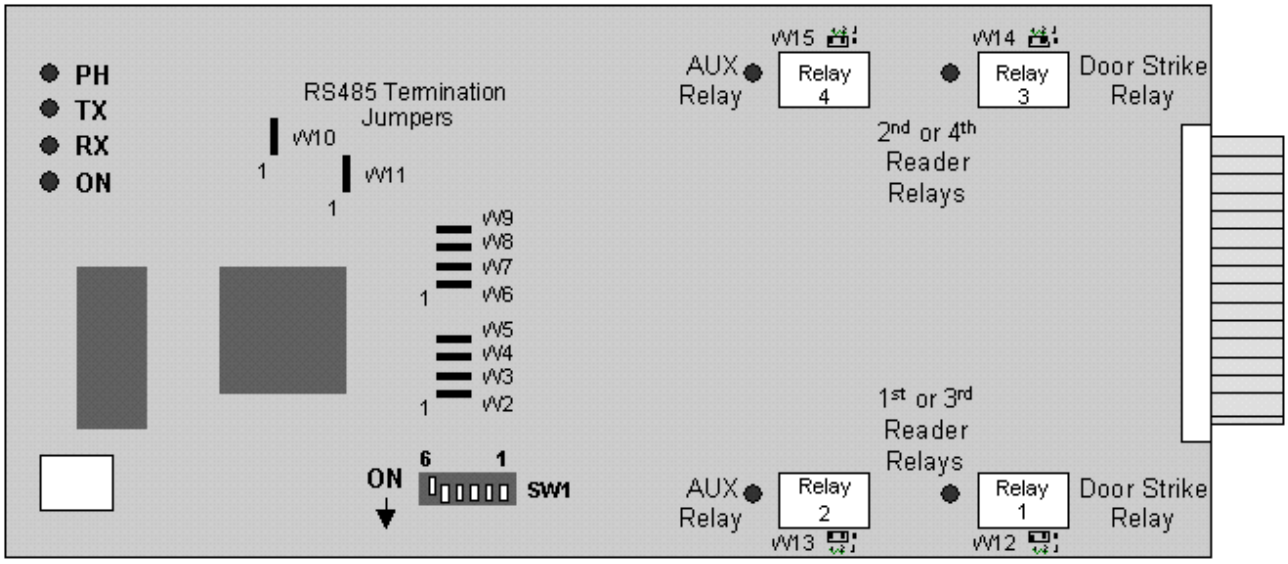

Figure 5-11: RRE-2 Component Layout

See Table 5-29 for jumper settings.

RRE-4 Components Layout

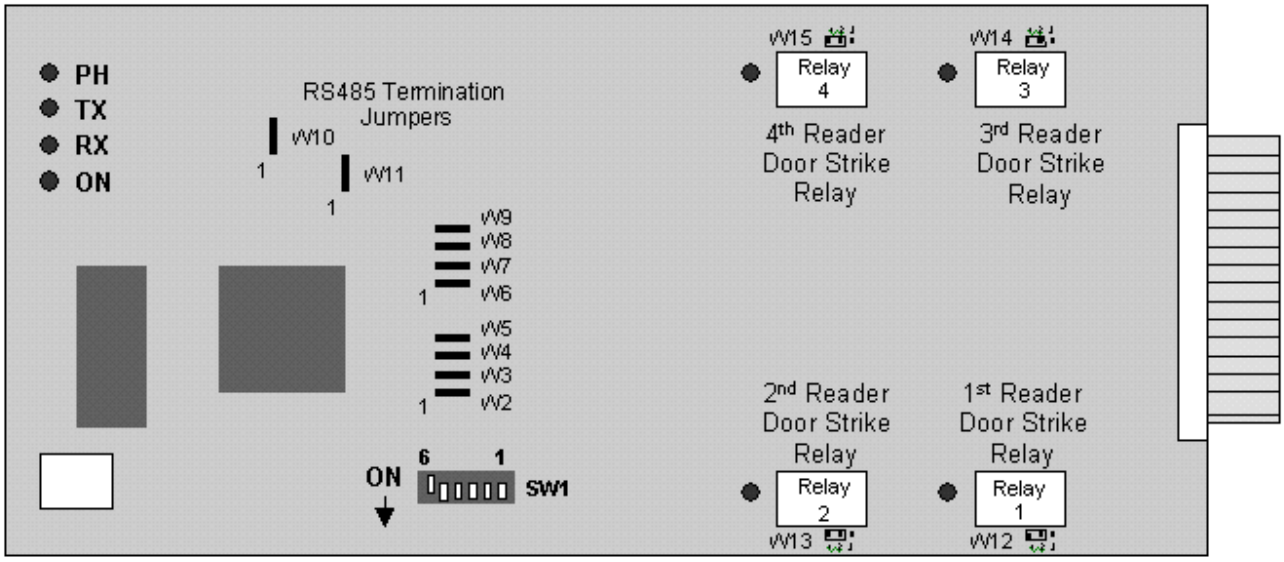

Figure 5-12: RRE-4 Component Layout

Jumper Settings on the RRE-2 and RRE-4

There are 14 jumpers located on the RRE-2 (Figure 5-11) and RRE-4 (Figure 5-12). Table 5-29 defines the function of the jumpers.

Jumper	Pins 1 & 2	Pins 2 & 3 or Jumper Removed
W15	Provides 24vdc through relay *	Dry Contacts
W14	Provides 24vdc through relay *	Dry Contacts
W13	Provides 24vdc through relay *	Dry Contacts
W12	Provides 24vdc through relay *	Dry Contacts

* Current for each relay contact limited to .5 Amps.

Reader# RRE-2	Reader # RRE-4	Jumper	Down or Left (1&2) = Terminated Up or Right (2&3) = Not Terminated
		W11	Terminates RS-485 Transmit
		W10	Terminates RS-485 Receive
Reader 0 or 1 Upper Address PROM 5 or 7	Reader 3	W9	Terminates Zone Input Z7 with a 1k-ohm resistor. *
		W8	Terminates Zone Input Z6 with a 1k-ohm resistor.
	Reader 2	W7	Terminates Zone Input Z5 with a 1k-ohm resistor. *
		W6	Terminates Zone Input Z4 with a 1k-ohm resistor.
Reader 2 or 3 Upper Address PROM 4 or 6	Reader 1	W5	Terminates Zone Input Z3 with a 1k-ohm resistor. *
		W4	Terminates Zone Input Z2 with a 1k-ohm resistor.
	Reader 0	W3	Terminates Zone Input Z1 with a 1k-ohm resistor. *
		W2	Terminates Zone Input Z0 with a 1k-ohm resistor.

* If the Exit Push Button is not connected, then another 1k resistor must be installed across the Zone Input

Table 5-29: RRE-2 and RRE-4 Jumper Settings

Power Up Self Test on the RRE-2 and RRE-4

The operation and status LED's will light as follows:

"PH" LED	Description
0.25 second flash	Power on
0.50 second flash	RAM Test OK
1.00 second flash	PROM Test OK, initialization complete

Table 5-30: Power Up LED

Normal Operation on the RRE-2 and RRE-4

The operation and status LED's will light as follows:

LED's	Description
PH	1 second flash
TX	On when transmitting to the ACU
RX	On when receiving from the ACU
ON	On when power is applied
Relay LEDs	On when relay is activated

Table 5-31: Normal LED Indicators

Alarm Zone Assignments For RRE-4

RRE-4 Physical Zones	Physical Zone Alarm Numbers Reader's 0 – 3 *	Physical Zone Alarm Numbers Reader's 4 – 7 *
R0Z0	16	32
R0Z1	17	33
R1Z0	20	36
R1Z1	21	37
R2Z0	24	40
R2Z1	25	41
R3Z0	28	44
R3Z1	29	45

Table 5-32: RRE-4 Alarm Numbers for Host PC

NOTE:

Defaults: Z0, Z2, Z4, Z6: Door Contact

Z1, Z3, Z4, Z7: Exit Push Button

If zones inputs are used for Door Contact and Exit Push Button then the alarm numbers in these columns are used to report a trouble condition at the sensor.

Relay Assignments For RRE-4

Version 8.10 and Older

READER	
Reader 0 Door Strike	17*
Reader 1 Door Strike	19*
Reader 2 Door Strike	21*
Reader 3 Door Strike	23*
Reader 4 Door Strike	25*
Reader 5 Door Strike	27*
Reader 6 Door Strike	29*
Reader 7 Door Strike	31*

Version 8.11 and Newer

READER	
Reader 0 Door Strike	16*
Reader 1 Door Strike	18*
Reader 2 Door Strike	20*
Reader 3 Door Strike	22*
Reader 4 Door Strike	24*
Reader 5 Door Strike	26*
Reader 6 Door Strike	28*
Reader 7 Door Strike	30*

* To use the RRE-4 Door Strike relay instead of the ACU controller's relay.

Table 5-33: RRE-4 Relay Numbers

Alarm Zone Assignments For RRE-2

Reader	RRE-2 Physical Zones	Physical Zone Alarm Numbers Reader's 0 – 3	Physical Zone Alarm Numbers Reader's 4 – 7
Switch 1 & 2 ON Reader 0 or 1 Upper Address PROM Reader 5 or 7	R0Z0	16	32
	R0Z1	17	33
	R0Z2	18	34
	R0Z3	19	35
	R1Z0	20	36
	R1Z1	21	37
	R1Z2	22	38
	R1Z3	23	39
Switch 3 & 4 ON Reader 2 or 3 Upper Address PROM Reader 4 or 6	R2Z0	24	40
	R2Z1	25	41
	R2Z2	26	42
	R2Z3	27	43
	R3Z0	28	44
	R3Z1	29	45
	R3Z2	30	46
	R3Z3	31	47

Table 5-34: RRE-2 Alarm Numbers for Host PC

NOTE: Only two readers may be connected to the RRE-2. They may be address only in pairs like 0 and 1 or 2 and 3, and with the upper address PROM installed address 4 and 5 or 6 and 7

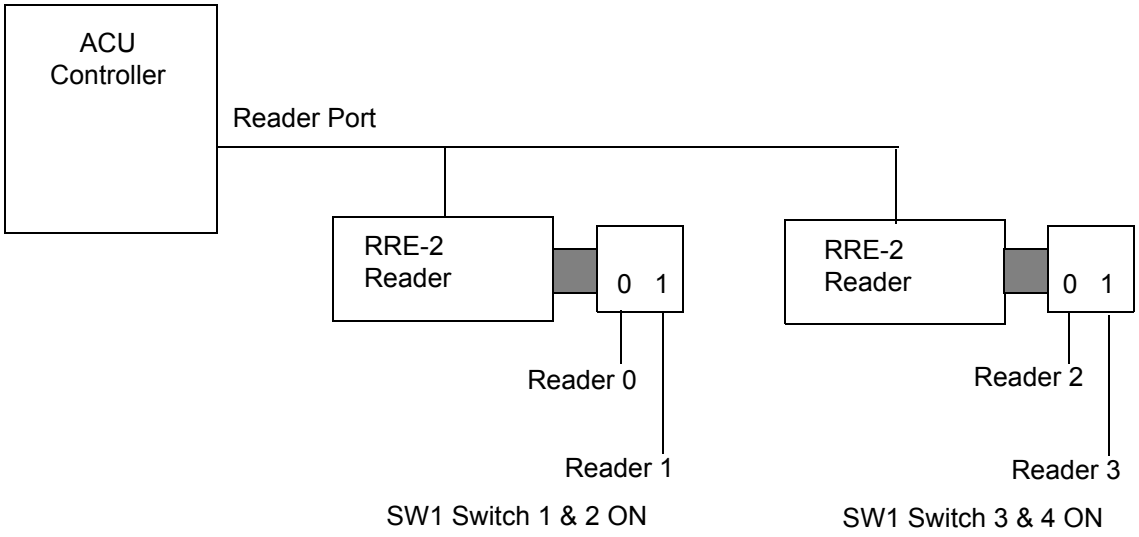

Figure 5-13: Overview for use of more than one RRE-2 on the same port.

Relay Assignments For RRE-2

Version 8.10 and Older

READER	
Reader 0 Door Strike AUX Relay	17* 17
Reader 1 Door Strike AUX Relay	19* 19
Reader 2 Door Strike AUX Relay	21* 21
Reader 3 Door Strike AUX Relay	23* 23
Reader 4 Door Strike AUX Relay	25* 25
Reader 5 Door Strike AUX Relay	27* 27
Reader 6 Door Strike AUX Relay	29* 29
Reader 7 Door Strike AUX Relay	31* 31

Version 8.11 and Newer

READER	
Reader 0 Door Strike AUX Relay	16* 17
Reader 1 Door Strike AUX Relay	18* 19
Reader 2 Door Strike AUX Relay	20* 21
Reader 3 Door Strike AUX Relay	22* 23
Reader 4 Door Strike AUX Relay	24* 25
Reader 5 Door Strike AUX Relay	26* 27
Reader 6 Door Strike AUX Relay	28* 29
Reader 7 Door Strike AUX Relay	30* 31

* To use the RRE-2 Door Strike relay instead of the ACU controller's relay.

Table 5-35: RRE-2 Relay Numbers

Paired Reader Operation

Readers on the same ACU controller can be configured as paired readers. The configuration allows readers to operate as 'in' and 'out' readers for a single door with or without exit push button. Paired readers share a single door contact. Mode changes for paired readers will affect both readers. Commands sent to the first reader of the pair are accepted. Commands sent to the second reader of a pair are ignored.

The door contact is wired to the first reader of the pair. Unused input zones can be used for more alarms or terminated with a resistor (see Table 5-8).

The Door Strike can be configured to operate a single relay for a door or separate relays for a turnstile.

Keypad Access Request

An RRE can be configured from the host computer to allow a card number to be entered from the keypad as well as accept card swipes. The number of digits to be entered is configurable from 1 to 9 digits.

The card number entered from the keypad is processed like a card swipe access request (except there is no test for issue code) with or without an additional PIN keypad number. Digits are entered until the count is reached or the '*' is entered. The '#' key clears currently entered digits.

RRE-2 Remote Reader Electronics

The RRE-2 Remote Reader Electronics (Figure 5-11) provides the electronic interface between the ACU controller and two Wiegand card read heads. The RRE-2 consists of the electronic circuit board, and the screw terminal connector board, connected together by a ribbon cable and is installed within a tampered enclosure. The RRE-2 provides the card read head communication interface as well as eight supervised alarm inputs for door contact, and request-to-exit. The RRE-4 can provide +12 and +5 volts for read heads and motion detectors. The RRE-4 also provides four Single Pole Double Throw relays configurable for door strike relays

Any of the four readers on the RRE-2 can be individually deactivated via DIP switch allowing you to also use an RRE01-E1L on the same port. However the rules of 4 readers per ACU reader port still applies.

Warning:

Do not use the ACU controller, Remote Reader Electronics RRE, RRE-2 or RRE-4), Remote Input Module (RIM) or Remote Relay Module (RRM) to switch any voltage above 30 volts. Failure to heed this WARNING: can cause death, personal injury or damage to unit(s).

Circuit Boards RRE-2

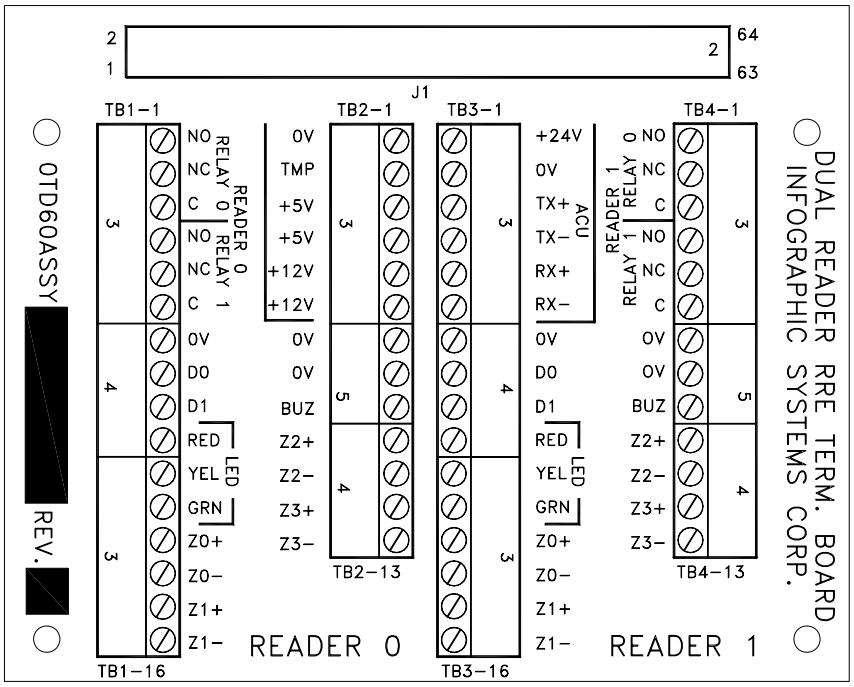

Figure 5-14: Shows the location of components discussed in this section.

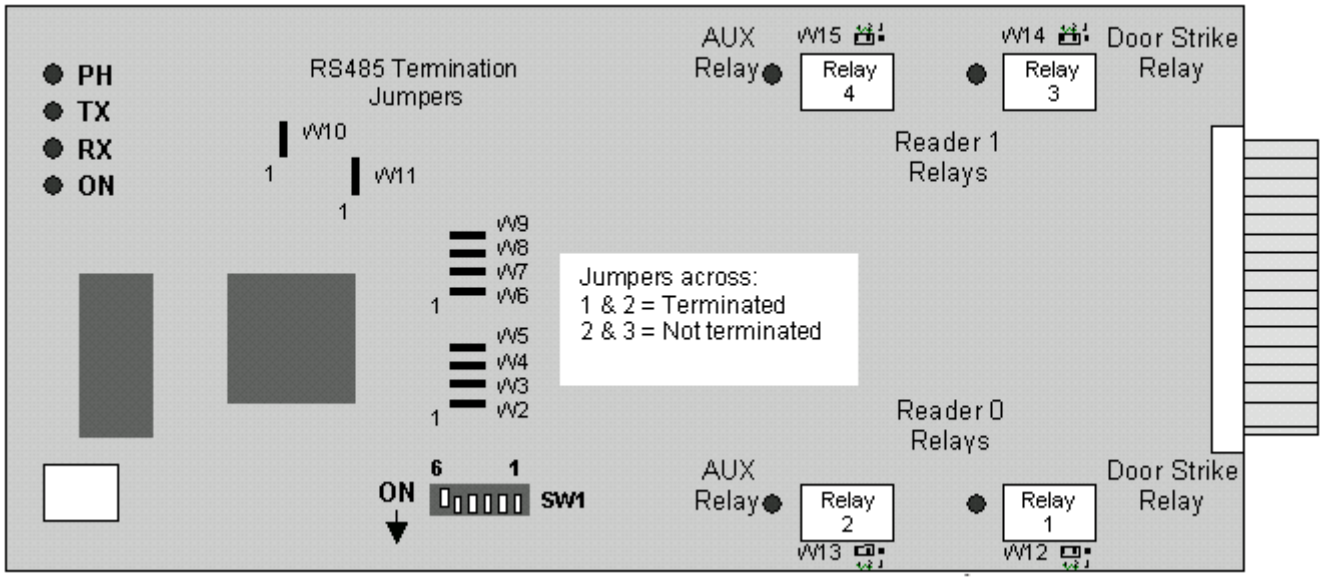

Figure 5-15: RRE-2 Circuit Board Component Locations

NOTE: PROM will indicate “2 Reader Support”

See Table 5-29 for jumper settings.

Connections to RRE-2

Table 5-36 though Table 5-39 show RRE-2 terminal block wiring connections. Refer to Chapter 3, Table 3-49 for applicable ACU controller connections and cable identifications.

TB1 Connections RRE-2

Pin No.	Term. Strip	Description	Reader Terminal TB1. Connected to:	Cable Color (Filled in by Installer)
1	NO	Relay 0 Normally Open	Reader 0 Door Strike	
2	NC	Relay 0 Normally Closed		
3	C	Relay 0 Common		
4	NO	Relay 1 Normally Open	Reader 0 Aux Relay 1	
5	NC	Relay 1 Normally Closed		
6	C	Relay 1 Common		
7	0V	Reader 0 Ground	Reader 0 Read Head	
8	D0	Reader 0 Data 0		
9	D1	Reader 0 Data 1		
10	RED LED	Reader 0 Red LED		
11	YEL LED	Reader 0 Yellow LED		
12	GRN LED	Reader 0 Green LED		
13	Z0+	Reader 0 Zone Input 0 (+)	Reader 0 Door Contact	
14	Z0-	Reader 0 Zone Input 0 (-)		
15	Z1+	Reader 0 Zone Input 1 (+)	Reader 0 Exit Push Button	
16	Z1-	Reader 0 Zone Input 1 (-)		

Table 5-36: RRE-2 TB1 Wiring Connections

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NOTES:

- Each ACU controller has 2 reader ports. The RRE-2 may be multi-dropped on each port along with Remote Relay Modules (RRM16-E1L) and Remote Input Modules (RIM16-E1L).
- Terminate the last Module on the reader cable.
- **Remote Modules should be Multi-dropped with no longer than a 10 ft. stub**.
- The distance between the RRE-2 and the read head is limited to 500 feet maximum using 18-gauge overall shielded cable. Always follow wiring instructions that come with the read head.
- Belden Cable No. 9409-18 suggested for door strikes.
- Belden Cable No. 9407-22 AWG suggested for zone sensors.
- Terminating any unused zone inputs.

TB2 Connections RRE-2

Pin No.	Term. Strip	Description	Reader Terminal TB2. Connected to:	Cable Color (Filled in by Installer)
1	0V	Tamper Ground	Enclosure's Tamper Switch	
2	TMP	Tamper Switch		
3	+5V	+5 @ 800 Milli-Amps	+5 VDC Power	
4	+5V			
5	+12V	+12 @ 800 Milli-Amps	+12 VDC Power	
6	+12V			
7	0V	0V Ground	0V Ground	
8	0V			
9	BUZ	Reader 0 Buzzer	Reader 0 Buzzer	
10	Z2+	Zone Input 2 (+)	Reader 0 Aux Input 2	
11	Z2-	Zone Input 2 (-)		
12	Z3+	Zone Input 3 (+)	Reader 0 Aux Input 3	
13	Z3-	Zone Input 3 (-)		

Table 5-37: RRE-2 TB2 Wiring Connections

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NOTES:

- Each ACU controller has 2 reader ports. The RRE-2 may be multi-dropped on each port along with Remote Relay Modules (RRM16-E1L) and Remote Input Modules (RIM16-E1L).
- Terminate the last Module on the reader cable.
- **Remote Modules should be Multi-dropped with no longer than a 10 ft. stub**.
- The distance between the RRE-2 and the read head is limited to 500 feet maximum using 18-gauge overall shielded cable. Always follow wiring instructions that come with the read head.
- Belden Cable No. 9409-18 suggested for door strikes.
- Belden Cable No. 9407-22 AWG suggested for zone sensors.
- Terminating any unused zone inputs.

TB3 Connections RRE-2

Pin No.	Term. Strip	Description	Reader Terminal TB1. Connected to:	Cable Color (Filled in by Installer)
1	+24V	24 VDC Input	ACU TB2-1 (+24V)	
2	0V	Ground	ACU TB2-2 (0V)	
3	TX+	From Expansion Port TX (+)	ACU TB2-3 (R2T+)	
4	TX-	From Expansion Port TX (-)	ACU TB2-4 (R2T-)	
5	RX+	From Expansion Port RX (+)	ACU TB2-5 (R2R+)	
6	RX-	From Expansion Port RX (-)	ACU TB2-6 (R2R-)	
7	0V	Reader 1 Ground	Reader 1 Read Head	
8	D0	Reader 1 Data 0		
9	D1	Reader 1 Data 1		
10	RED LED	Reader 1 Red LED		
11	YEL LED	Reader 1 Yellow LED		
12	GRN LED	Reader 1 Green LED		
13	Z0+	Reader 1 Zone Input 0 (+)	Reader 1 Door Contact	
14	Z0-	Reader 1 Zone Input 0 (-)		
15	Z1+	Reader 1 Zone Input 1 (+)	Reader 1 Exit Push Button	
16	Z1-	Reader 1 Zone Input 1 (-)		

Table 5-38: RRE-2 TB3 Wiring Connections

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NOTES:

- Each ACU controller has 2 reader ports. The RRE-2 may be multi-dropped on each port along with Remote Relay Modules (RRM16-E1L) and Remote Input Modules (RIM16-E1L).
- Terminate the last Module on the reader cable.
- **Remote Modules should be Multi-dropped with no longer than a 10 ft. stub**.
- The distance between the RRE-2 and the read head is limited to 500 feet maximum using 18-gauge overall shielded cable. Always follow wiring instructions that come with the read head.
- Belden Cable No. 9409-18 suggested for door strikes.
- Belden Cable No. 9407-22 AWG suggested for zone sensors.
- Terminating any unused zone inputs.

TB4 Connections RRE-2

Pin No.	Term. Strip	Description	Reader Terminal TB2. Connected to:	Cable Color (Filled in by Installer)
1	NO	Relay 0 Normally Open	Reader 1 Door Strike	
2	NC	Relay 0 Normally Closed		
3	C	Relay 0 Common		
4	NO	Relay 1 Normally Open		
5	NC	Relay 1 Normally Closed	Reader 1 Aux Relay 1	
6	C	Relay 1 Common		
7	0V	Reader 1 Ground	Reader 1 Groun	
8	0V			
9	BUZ	Reader 1 Buzzer	Reader 1 Buzzer	
10	Z2+	Reader 1 Zone Input 2 (+)	Reader 1 Aux Input 2	
11	Z2-	Reader 1 Zone Input 2 (-)		
12	Z3+	Reader 1 Zone Input 3 (+)	Reader 1 Aux Input 3	
13	Z3-	Reader 1 Zone Input 3 (-)		

Table 5-39: RRE-2 TB4 Wiring Connections

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NOTES:

- Each ACU controller has 2 reader ports. The RRE-2 may be multi-dropped on each port along with Remote Relay Modules (RRM16-E1L) and Remote Input Modules (RIM16-E1L)
- Terminate the last Module on the reader cable.
- **Remote Modules should be Multi-dropped with no longer than a 10 ft. stub**.
- The distance between the RRE-2 and the read head is limited to 500 feet maximum using 18-gauge overall shielded cable. Always follow wiring instructions that come with the read head.
- Belden Cable No. 9409-18 suggested for door strikes.
- Belden Cable No. 9407-22 AWG suggested for zone sensors
- Terminating any unused zone inputs.

RRE-4 Remote Reader Electronics

The RRE-4 (part numbers RRE04-E00 and RRE04-E1L) Remote Reader Electronics (Figure 5-16) provides the electronic interface between the ACU controller and four Wiegand or Magstripe card read heads. The RRE-4 consists of the electronic circuit board, and the screw terminal connector board, connected together by a ribbon cable and is installed within a tampered enclosure. The RRE-4 provides the card read head communication interface as well as eight supervised alarm inputs for door contact, and request-to-exit. The RRE-4 can provide +12 and +5 volts for read heads and motion detectors. The RRE-4 also provides four Single Pole Double Throw relays configurable for door strike relays

Any of the four readers on the RRE-4 can be individually deactivated via DIP switch allowing you to also use an RRE01-E1L on the same port. However the rules of 4 readers per ACU reader port still applies.

Warning:

Do not use the ACU controller, Remote Reader Electronics RRE, RRE-2 or RRE-4), Remote Input Module (RIM) or Remote Relay Module (RRM) to switch any voltage above 30 volts. Failure to heed this WARNING: can cause death, personal injury or damage to unit(s).

Circuit Boards RRE-4

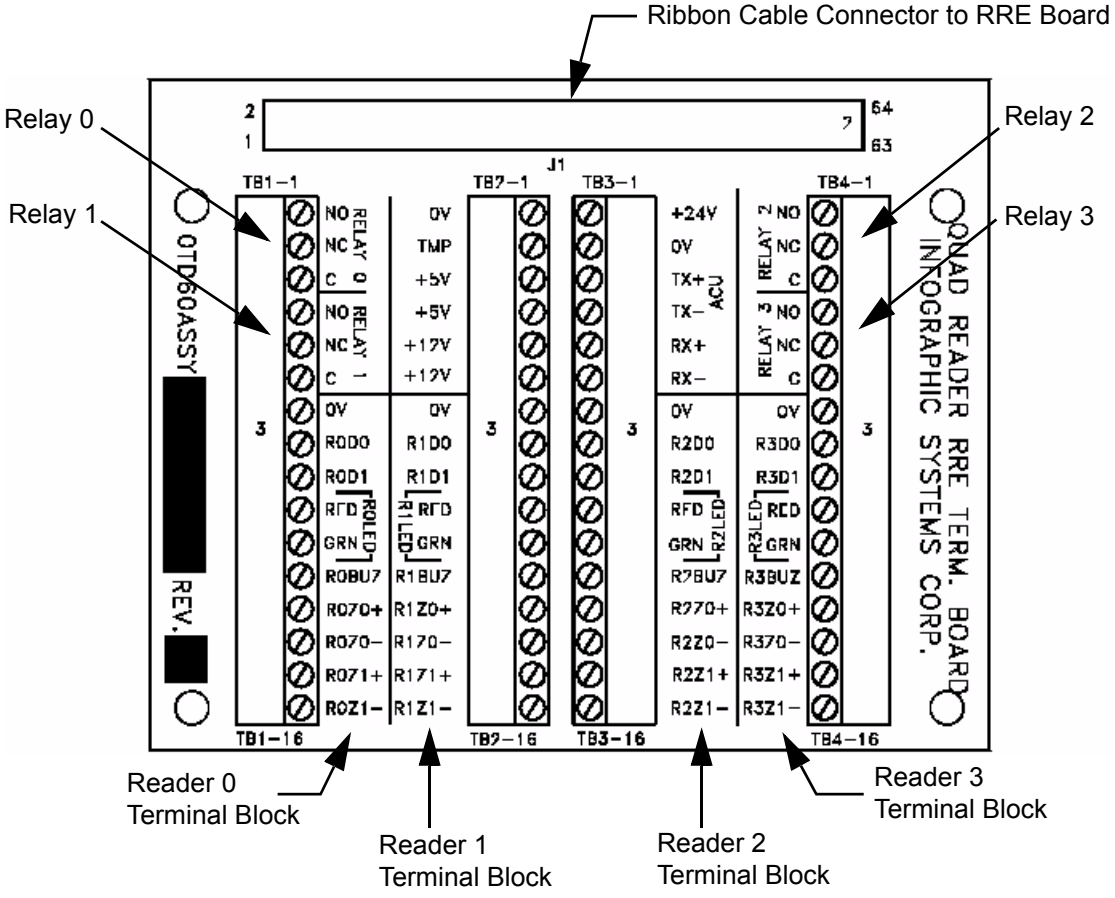
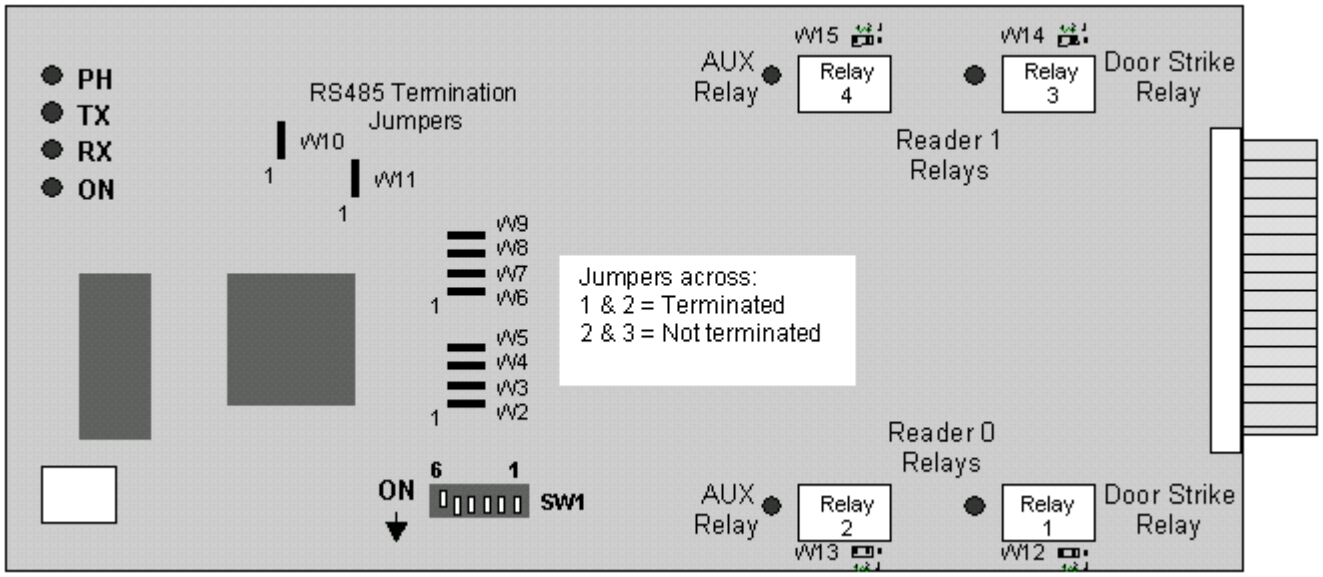


Figure 5-16: Shows the location of components discussed in this section

Figure 5-17: RRE-4 Circuit Board Component Locations



See Table 5-29 for jumper settings.

Connections RRE-4

Table 5-40 though Table 5-44 show RRE-4 terminal block wiring connections. Refer to Chapter 3, Table 3-49 for applicable ACU controller connections and cable identifications.

RRE-4 TB1 Connections

Pin No.	PIN Label	Description	Reader Terminal TB1. Connected to:	Cable Color (Filled in by Installer)
1	NO	Relay 0 Normally Open	1st Reader's Door Strike	
2	NC	Relay 0 Normally Closed		
3	C	Relay 0 Common		
4	NO	Relay 1 Normally Open	2nd Reader's Door Strike	
5	NC	Relay 1 Normally Closed		
6	C	Relay 1 Common		
7	0V	Reader 0 Ground	1st Reader's Read Head	
8	D0	Reader 0 Data 0		
9	D1	Reader 0 Data 1		
10	RED	Reader 0 Red LED		
11	GRN	Reader 0 Green LED		
12	BUZ	Reader 0 Buzzer Output		
13	Z0+	Reader 0 Zone Input 0 (+)	1st Reader Door Contact	
14	Z0-	Reader 0 Zone Input 0 (-)		
15	Z1+	Reader 0 Zone Input 1 (+)	1st Reader Exit Push Button	
16	Z1-	Reader 0 Zone Input 1 (-)		

Table 5-40: RRE-4 TB1 Wiring Connections

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NOTES:

- Each ACU controller has 2 reader ports. Two RRE-4s may be multi-dropped on each port only if an ACU/16 is used, along with Remote Relay Modules (RRM) and Remote Input Modules (RIM).
- Terminate the last Module on the reader cable.
- **Remote Modules should be Multi-dropped with no longer than a 10 ft. stub**.
- The distance between the RRE-4 and the read head is limited to 500 feet maximum using 18-gauge overall shielded cable. Always follow wiring instructions that come with the read head.
- Belden Cable No. 9409-18 suggested for door strikes.
- Belden Cable No. 9407-22 AWG suggested for zone sensors.
- Terminating any unused zone inputs.

TB2 Connections RRE-4

Pin No.	PIN Label	Description	Reader Terminal TB2. Connected to:	Cable Color (Filled in by Installer)
1	0V	Tamper Ground	Enclosure's Tamper Switch	
2	TMP	Tamper Switch		
3	+5V	+5 @ 800 Milli-Amps	+5 VDC Power	
4	+5V			
5	+12V	+12 @ 800 Milli-Amps	+12 VDC Power	
6	+12V			
7	0V	Reader 1 Ground	2nd Reader's Read Head	
8	D0	Reader 1 Data 0		
9	D1	Reader 1 Data 1		
10	RED	Reader 1 Red LED		
11	GRN	Reader 1 Green LED		
12	BUZ	Reader 1 Buzzer Output		
13	Z2+	Reader 1 Zone Input 0 (+)	2nd Reader's Door Contact	
14	Z2-	Reader 1 Zone Input 0 (-)		
15	Z3+	Reader 1 Zone Input 1 (+)	2nd Reader's Exit Push Button	
16	Z3-	Reader 1 Zone Input 1 (-)		

Table 5-41: RRE-4 TB2 Wiring Connections

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NOTES:

- Each ACU controller has 2 reader ports. Two RRE-4s may be multi-dropped on each port only if an ACU/16 is used, along with Remote Relay Modules (RRM) and Remote Input Modules (RIM).
- Terminate the last Module on the reader cable.
- **Remote Modules should be Multi-dropped with no longer than a 10 ft. stub**.
- The distance between the RRE-4 and the read head is limited to 500 feet maximum using 18-gauge overall shielded cable. Always follow wiring instructions that come with the read head.
- Belden Cable No. 9409-18 suggested for door strikes.
- Belden Cable No. 9407-22 AWG suggested for zone sensors.
- Terminating any unused zone inputs.

Readers 0 through 3 or 8 through 11 (ACU Reader Port #1)

TB3 Connections RRE-4

Pin No.	PIN Label	Description	Reader Terminal TB3. Connected to:	Cable Color (Filled in by Installer)
1	+24V	24 VDC Input	ACU TB2-7 (+24V)	
2	0V	Ground	ACU TB2-8 (0V)	
3	TX+	From Expansion Port TX (+)	ACU TB2-9 (R1T+)	
4	TX-	From Expansion Port TX (-)	ACU TB2-10 (R1T-)	
5	RX+	From Expansion Port RX (+)	ACU TB2-11 (R1R+)	
6	RX-	From Expansion Port RX (-)	ACU TB2-12 (R1R-)	
7	0V	Reader 2 Ground	3rd Reader's Read Head	
8	D0	Reader 2 Data 0		
9	D1	Reader 2 Data 1		
10	RED	Reader 2 Red LED		
11	GRN	Reader 2 Green LED		
12	BUZ	Reader 2 Buzzer Output		
13	Z0+	Reader 2 Zone Input 0 (+)	3rd Reader's Door Contact	
14	Z0-	Reader 2 Zone Input 0 (-)		
15	Z1+	Reader 2 Zone Input 1 (+)	3rd Reader's Exit Push Button	
16	Z1-	Reader 2 Zone Input 1 (-)		

Table 5-42: RRE-4 TB3 Wiring Connections

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NOTES:

- Each ACU controller has 2 reader ports. Two RRE-4s may be multi-dropped on each port only if an ACU/16 is used, along with Remote Relay Modules (RRM) and Remote Input Modules (RIM).
- Terminate the last Module on the reader cable.
- **Remote Modules should be Multi-dropped with no longer than a 10 ft. stub**.
- The distance between the RRE-4 and the read head is limited to 500 feet maximum using 18-gauge overall shielded cable. Always follow wiring instructions that come with the read head.
- Belden Cable No. 9409-18 suggested for door strikes.
- Belden Cable No. 9407-22 AWG suggested for zone sensors.
- Terminating any unused zone inputs.

Readers 4 through 7 or 12 through 15 (ACU Reader Port #2)

TB3 Connections RRE-4

Pin No.	PIN Label	Description	Reader Terminal TB3. Connected to:	Cable Color (Filled in by Installer)
1	+24V	24 VDC Input	ACU TB2-1 (+24V)	
2	0V	Ground	ACU TB2-2 (0V)	
3	TX+	From ACU TX (+)	ACU TB2-3 (R1T+)	
4	TX-	From ACU TX (-)	ACU TB2-4 (R1T-)	
5	RX+	From ACU RX (+)	ACU TB2-5 (R1R+)	
6	RX-	From ACU RX (-)	ACU TB2-6 (R1R-)	
7	0V	3rd Reader Ground	3rd Reader's Read Head	
8	D0	3rd Reader's Data 0		
9	D1	3rd Reader's Data 1		
10	RED	3rd Reader's Red LED		
11	GRN	3rd Reader's Green LED		
12	BUZ	3rd Reader's Buzzer		
13	Z0+	Zone Input 4 (+)	3rd Reader's Door Contact	
14	Z0-	Zone Input 4 (-)		
15	Z1+	Zone Input 5 (+)	3rd Reader's Exit Push Button	
16	Z1-	Zone Input 5 (-)		

Table 5-43: RRE-4 TB3 Wiring Connections

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NOTES:

- Each ACU controller has 2 reader ports. Two RRE-4s may be multi-dropped on each port only if an ACU/16 is used, along with Remote Relay Modules (RRM) and Remote Input Modules (RIM).
- Terminate the last Module on the reader cable.
- **Remote Modules should be Multi-dropped with no longer than a 10 ft. stub**.
- The distance between the RRE-4 and the read head is limited to 500 feet maximum using 18-gauge overall shielded cable. Always follow wiring instructions that come with the read head.
- Belden Cable No. 9409-18 suggested for door strikes.
- Belden Cable No. 9407-22 AWG suggested for zone sensors.
- Terminating any unused zone inputs.

TB4 Connections RRE-4

Pin No.	PIN Label	Description	Reader Terminal TB4. Connected to:	Cable Color (Filled in by Installer)
1	NO	Relay 2 Normally Open	3rd Reader's Door Strike	
2	NC	Relay 2 Normally Closed		
3	C	Relay 2 Common		
4	NO	Relay 3 Normally Open	4th Reader's Door Strike	
5	NC	Relay 3 Normally Closed		
6	C	Relay 3 Common		
7	0V	Reader 3 Ground	4th Reader's Read Head	
8	D0	Reader 3 Data 0		
9	D1	Reader 3 Data 1		
10	RED	Reader 3 Red LED		
11	GRN	Reader 3 Green LED		
12	BUZ	Reader 3 Buzzer		
13	Z0+	Reader 3 Zone Input 6 (+)	4th Reader Door Contact	
14	Z0-	Reader 3 Zone Input 6 (-)		
15	Z1+	Reader 3 Zone Input 7 (+)	4th Reader Exit Push Button	
16	Z1-	Reader 3 Zone Input 7 (-)		

Table 5-44: RRE-4 TB4 Wiring Connections

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NOTES:

- Each ACU controller has 2 reader ports. Two RRE-4s may be multi-dropped on each port only if an ACU/16 is used, along with Remote Relay Modules (RRM) and Remote Input Modules (RIM).
- Terminate the last Module on the reader cable.
- **Remote Modules should be Multi-dropped with no longer than a 10 ft. stub**.
- The distance between the RRE-4 and the read head is limited to 500 feet maximum using 18-gauge overall shielded cable. Always follow wiring instructions that come with the read head.
- Belden Cable No. 9409-18 suggested for door strikes.
- Belden Cable No. 9407-22 AWG suggested for zone sensors.
- Terminating any unused zone inputs.

Paired Reader Operation

Readers on the same ACU controller can be configured as paired readers. The configuration allows readers to operate as 'in' and 'out' readers for a single door with or without exit push button. Paired readers share a single door contact. Mode changes for paired readers will affect both readers. Commands sent to the first reader of the pair are accepted. Commands sent to the second reader of a pair are ignored.

The door contact is wired to the first reader of the pair. Unused input zones can be used for more alarms or terminated with a resistor (see Table 5-34).

The Door Strike can be configured to operate a single relay for a door or separate relays for a turnstile.

Keypad Access Request

An RRE-4 can be configured from the host computer to allow a card number to be entered from the keypad as well as accept card swipes. The number of digits to be entered is configurable from 1 to 9 digits.

The card number entered from the keypad is processed like a card swipe access request (except there is no test for issue code) with or without an additional PIN keypad number. Digits are entered until the count is reached or the '*' is entered. The '#' key clears currently entered digits.

RRE-4 Remote Reader Electronics

The RRE-4 Remote Reader Electronics (Figure 5-17) provides the electronic interface between the ACU controller and four Wiegand card read heads. The RRE-4 consists of the electronic circuit board, and the screw terminal connector board, connected together by a ribbon cable and is installed within a tampered enclosure. The RRE-4 provides the card read head communication interface as well as twelve supervised alarm inputs for door contact, and request-to-exit an d+5 volts for read heads and motion detectors. The RRE-4 also provides four Single Pole Double Throw relays configurable for door strike relays.

The RRE-2A can provide 8 Supervised input for door contact, and request-to-exit. Any of the four readers on the RRE-2A can also be individually deactivated via DIP switch allowing you to use an RRE01-E1L on the same port. However the rules of 4 readers per ACU reader port still applies.

Warning:

Do not use the ACU controller, Remote Reader Electronics RRE, RRE-2 or RRE-4), Remote Input Module (RIM) or Remote Relay Module (RRM) to switch any voltage above 30 volts. Failure to heed this WARNING: can cause death, personal injury or damage to unit(s).

Magstripe Extender (IGR-RMSMAG-EXT)

If the distance from a RMS-10 to its RRE extends beyond 12 feet (3.64 meters), a Magstripe Extender must be used. The maximum distance from RMS-10 to the RRE is 500 feet (160 meters).

Part #135362 includes the converter and a 12” cable for the RMS-10 side.

A 12-foot cable with RJ-45 connector on one end, Part# 134812-1, can be spliced to installer provided cable to connect the Magstripe Extender to the RRE, or the installer may choose to terminate the cable with a RJ-45 connector directly.

RJ-45 Cable From RMS-10

Pin See Notes	Function
1	0 V
2	RCL
3	RDA
4	+ 5 V
5	Green LED
6	Yellow LED
7	Red LED
8	FR GRND See notes

EXTENDER

RJ-45 Cable to RRE

Function	RRE Pin
0 V	TB2-4
D 1	TB2-6
D 0	TB2-5
+ 5 V	TB2-7
Green LED	TB2-10
Yellow LED	TB2-9
Red LED	TB2-8
0 V	TB2-4

Table 5-45: RJ-45 Cable From RMS-10 and RRE

DIP Switch SW1	4	5
RRE01-E1L	ON	OFF
RRE-2, 4 ACU-R2 & ACU-R4	N/A	OFF

Table 5-46: RRE Switch setting

NOTES:

- The extender is <u>not</u> <u>required</u> when connecting a magstripe reader to an RRE1 providing dipswitch SW1 – 4 & 5 on the RRE are set properly.
- RJ-45 pin numbering convention—With the open end of the receptacle facing the viewer and the RJ-45 clip/stay in the up position, Pin 1 starts from the left. See Figure 5-21 or Figure 5-23.
- FR GRND is used for local static suppression and is tied to 0 V at the RRE.
- Revision J or higher EPROM must be installed on the RRE.
- For purposes of clarity RDA is the Magstripe equivalent of the Wiegand D0 and RCL the same of D1. These are labeled RDA & RCL on the RRE and RxD0 & RxD1 on the RRE-4. What these inputs do depends on the DIP switch 5 setting (ON for Wiegand data, OFF for Magstripe) and the attached reader technology.

4 Port RS-485 Expander

This section contains instructions on installing and wiring the 4 Port RS-485 Expander. The RS-485 Expander installations have not been evaluated by UL. The 4 Port RS-485 Expander may not be installed within the ACU enclosure if the installation is to be UL 1076 and/or UL 294 approved.

NOTE: See Table A-13 for information about hardware model numbers.

The RS-485 Expander was designed to support remote reader electronics (RRE) connected in a 'star' arrangement. Since the device used standard RS-485 protocol, installers can also utilize the expander with ACU devices.

This configuration is useful on installations that have existing readers wired back to one location. Connecting a 'slave' board to the 4-Port RS-485 Expander can double its capacity.

NOTE: This device is intended only for retrofit projects and will not have UL approval.

Below is a block diagram example of a possible configuration using the 4-Port Expander with several RRE Readers.

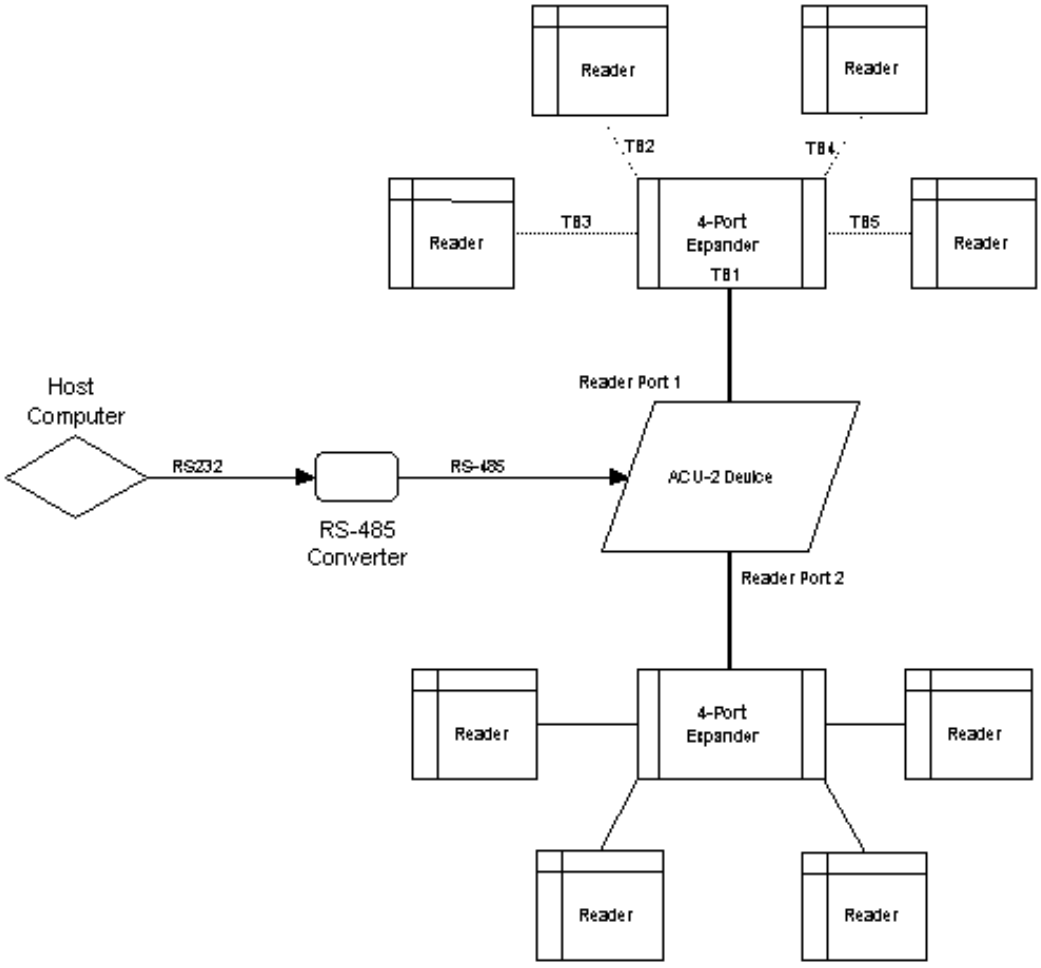

Figure 5-18: Reader Star Configuration with 4-Port Expander

Each ACU controller has 2 Reader ports. Four readers may be multi-dropped on each port along with Remote Relay Modules (RRM) and Remote Input Modules (RIM).

The combined distance of all RS-485 branches cannot exceed 4000 feet.

Terminate the RS-485 loop at the start and at the device farthest from the 4-Port RS-485 Expander.

Connections for the 4-Port RS-485 Expander

TB1 (Port A)	Description	From ACU connector TB2 (Red)	Cable Color (Filled by Installer)
+24V	+ 24 Volts In	ACU TB2-7 (+24V)	
0V	Ground	ACU TB2-8 (0V)	
TX+	From ACU TX (+)	ACU TB2-9 (R1T+)	
TX-	From ACU TX (-)	ACU TB2-10 (R1T-)	
RX+	From ACU RX(+)	ACU TB2-11 (R1R+)	
RX-	From ACU RX (-)	ACU TB2-12 (R1R-)	

Table 5-47: Wiring Connections from 4-Port RS-485 Expander to ACU-2 Reader Port 1. (TB1)

TB1 (Port A)	Description	ACU connector TB2 (Red)	Cable Color (Filled by Installer)
+24V	+ 24 Volts In	ACU TB2-1 (+24V)	
0V	Ground	ACU TB2-2 (0V)	
TX+	From ACU TX (+)	ACU TB2-3 (R1T+)	
TX-	From ACU TX (-)	ACU TB2-4 (R1T-)	
RX+	From ACU RX(+)	ACU TB2-5 (R1R+)	
RX-	From ACU RX (-)	ACU TB2-6 (R1R-)	

Table 5-48: Wiring Connections from 4-Port RS-485 Expander to ACU-2 Reader Port 2. (TB1)

TB2 – TB5	Description	RRE connector TB1:	Cable Color (Filled by Installer)
+24V	+ 24 Volts In	TB1-1 (+24V)	
0V	Ground	TB1-2 (0V)	
TX+	Transmit plus from Expander Port.	TB1-4 (TX+)	
TX-	Transmit neg, from Expander Port.	TB1-5 (TX-)	
RX+	Receive plus from Expander Port.	TB1-6 (RX+)	
RX-	Receive neg. from Expander Port	TB1-7 (RX-)	

Table 5-49: Typical Wiring Connections 4-Port RS-485 Expander (TB2 through TB5) to RRE

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NOTES:

- Each ACU controller has 2 reader ports. One 4-Port RS-485 Expander can be connected on each port along with RREs, Remote Relay Modules (RRM) and Remote Input Modules (RIM).
- Belden Cable numbers suggested: 9842-24 AWG for 4000-ft. (1220 meters) maximum distance and use Belden 9409-18 to power the remote modules for 4000-ft. (1220 meters) maximum distance.
- **'T' Tapping of the RS-485 circuit should be avoided, but if necessary should not exceed 10 feet**.

4-Port RS-485 Expander Component Location Boards Only

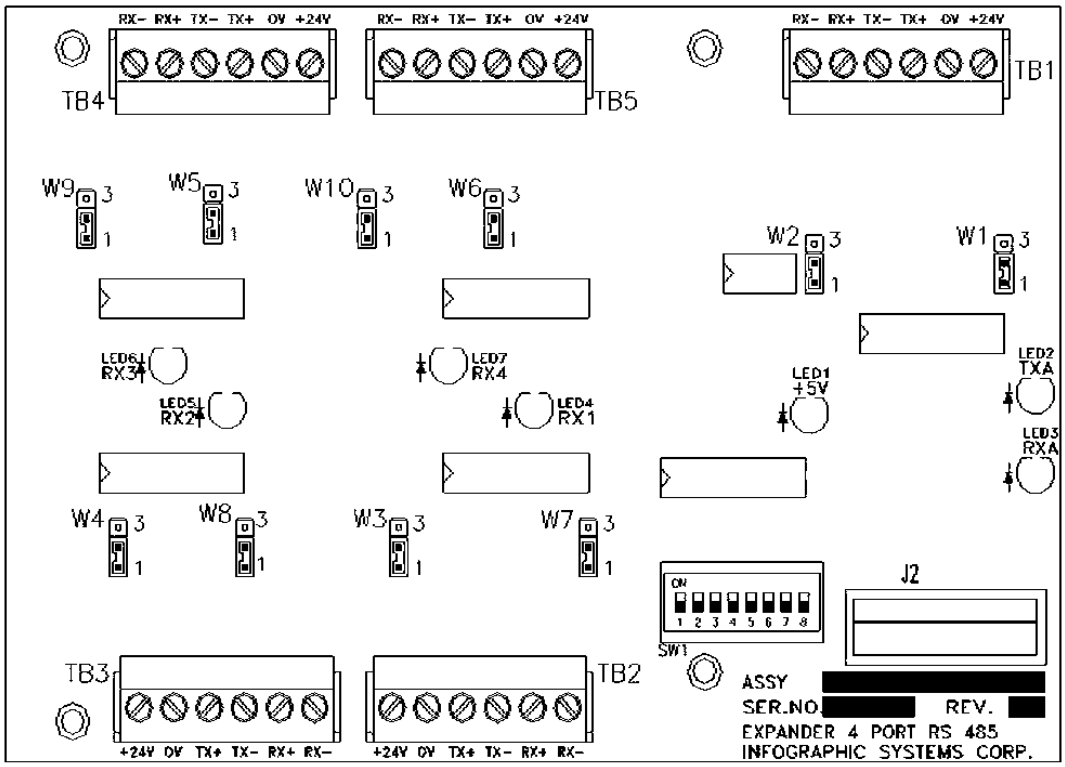


Figure 5-19: Four-Port RS485 Expander Component Location (135187-01 Board Only)

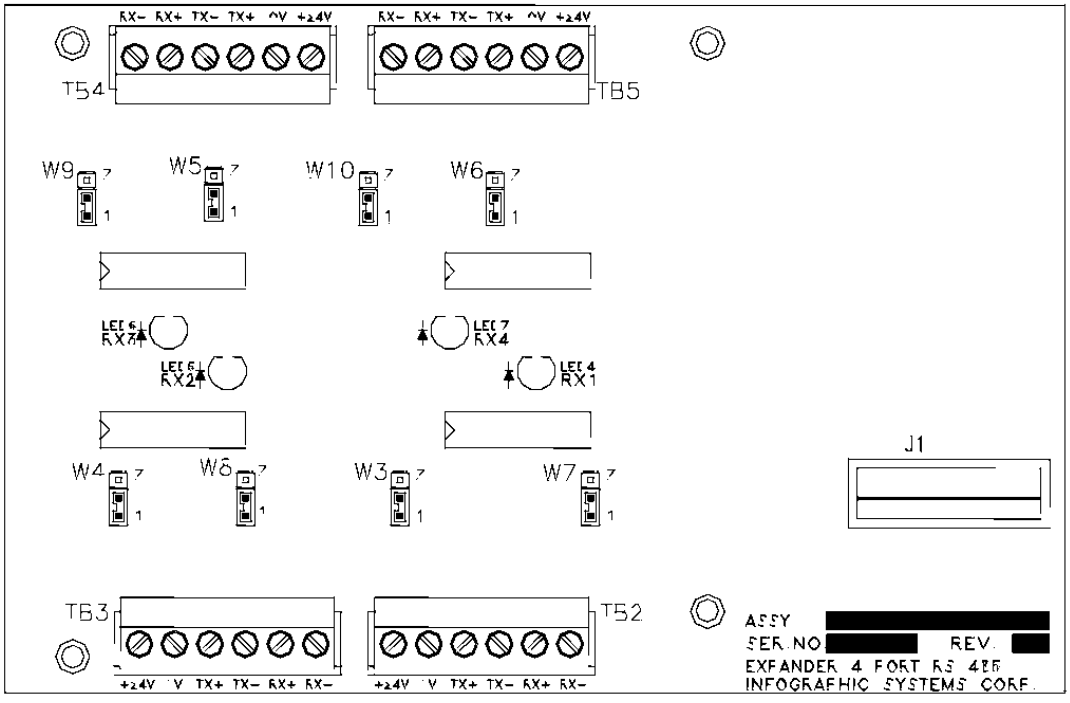


Figure 5-20: Four-Port RS485 Expander (4 Port Add-on) Component Location (135187-02 Board Only)

NOTE: The 4 port Add-On module comes equipped with a ribbon cable connected at J1 that plugs into J2 on the master expander board.

RS-485 Termination Jumpers

Master Expander

Jumper	Function
W1	PORT A – TRANSMIT (TB1-TX)
W2	PORT A – RECEIVE (TB1-RX)
W3	PORT 1 – TRANSMIT (TB2-TX)
W4	PORT 2 – TRANSMIT (TB3-TX)
W5	PORT 3 – TRANSMIT (TB4-TX)
W6	PORT 4 – TRANSMIT (TB5-TX)
W7	PORT 1 – RECEIVE (TB2-RX)
W8	PORT 2 – RECEIVE (TB3-RX)
W9	PORT 3 – RECEIVE (TB4-RX
W10	PORT 4 – RECEIVE (TB5-RX)

4 Port Add-On Expander (Optional

Jumper	Function
W1	NOT PRESENT
W2	NOT PRESENT
W3	PORT 5 – TRANSMIT (TB2-TX)
W4	PORT 6 – TRANSMIT (TB3-TX)
W5	PORT 7 – TRANSMIT (TB4-TX)
W6	PORT 8 – TRANSMIT (TB5-TX)
W7	PORT 5 – RECEIVE (TB2-RX)
W8	PORT 6 – RECEIVE (TB3-RX)
W9	PORT 7 – RECEIVE (TB4-RX
W10	PORT 8 – RECEIVE (TB5-RX)

Table 5-50: RS-485 Termination Jumpers

- POSITION 1 & 2 = TERMINATED
- POSITION 2 & 3 = NOT TERMINATED

NOTE: Terminate the RS-485 loop at the start and on the farthest reader from the ACU controller.

DIP Switch Settings

Switch	Function
SW1-1	PORT 1
SW1-2	PORT 2
SW1-3	PORT 3
SW1-4	PORT 4
SW1-5	PORT 5*
SW1-6	PORT 6*
SW1-7	PORT 7*
SW1-8	PORT 8*

When ordering, use the following model (part) number:

NCEX-1 (135195)

One (1) Master Board in 12”x12”x4” enclosure with tamper switch.

NCEX-2 (135193)

One (1) 135187-01 Master Board and One (1) 135187-02 Add-On board in 12”x12”x4” enclosure with tamper switch.

NCEX-3 (135194)

Two (2) 135187-01 Master boards in 12”x12”x4” enclosure with tamper switch.

Table 5-51: DIP Switch Settings

- OFF = PORT DISABLED
- ON = PORT ENABLED

* PORTS 5-8 RESIDE ON OPTIONAL ADD-ON EXPANDER UNIT.

LED Definitions

Master Expander		Add-On Expander (Optional)	
LED No.	**Function**	**LED No.**	**Function**
LED1 / +5V	Unit Powered on		
LED2 / TXA	Port A – Receive Data		
LED3 / RXA	Port A – Transmit Data		
LED4 / RX1	Port 1 – Receive Data	LED4 / RX1	Port 5 – Receive Data
LED5 / RX2	Port 2 – Receive Data	LED5 / RX2	Port 6 – Receive Data
LED6 / RX3	Port 3 – Receive Data	LED6 / RX3	Port 7 – Receive Data
LED7 / RX4	Port 4 – Receive Data	LED7 / RX4	Port 8 – Receive Data

Table 5-52: LED Definitions

RRE Reader and Keypad Connections

GE Security Proximity Readers 240 and 245

Refer to Table 5-10 through Table 5-13 for RRE terminal identification. Table 5-53 shows the wiring connections for the GE Security Proximity readers to the RRE. Always follow the instructions that come with the GE Security readers. See Table A-13 for current part number information.

See UL Specification's Section for additional information.

PIN #	Function	Connection to RRE
1	Buzzer	TB2-11 (BUZ)
2	0V	TB2-4 (0 V)
3	12 vdc	TB1-3 (12V)
4	Not Used	No Connection
5	Not Used	No Connection
6	Not Used	No Connection
7	Green LED	TB2-10 (GRN)
8	Red LED	TB2-8 (RED)
9	Not Used	No Connection
10	Not Used	No Connection
11	Data 0	TB2-5 (Rda)
12	Data 1	TB2-6 (Rcl)

Table 5-53: Wiring GE Security Proximity Readers 240 and 245 to the RRE

The reader can be installed up to a maximum cable distance of 500 feet (152 meters) from the RRE.

Use as seven conductor stranded wire with an overall shield. The 240 (reader only) hooks up identical to the 245 (reader with keypad). Shield must be connected to earth ground at one end only.

NOTE: Both readers must use the Custom Wiegand format (settings shown below) and minimum firmware version 5.68.00 for ACUXL and ACURS2/4 or version 2.66.00 for ACU2, ACU2R2 or ACU2R4.

When using GE Security readers a Custom Wiegand card format must be set up in the software. Use the information listed on the right for setting up the custom card format and the Software User Guides below on how to set them up.
For Diamond II Software see *Custom Card Format* in Chapter 6.
For Sapphire Pro Software see *Variable Card Page* Chapter 7.

Length = 48 bits, No Parity
CC = 1/8 (mfg id inverted)
FC = 2/0
C# = 17/32
IC = 2/0

RRE Switch SW1 must be set as shown below when using the GE Security reader

Set RRE for standard Wiegand output

DIP Switch SW1	4	5
RRE01-E1L	OFF	ON
RRE-2, 4 ACU-R2 & ACU-R4	N/A	ON

Table 5-54: RRE Switch setting when using GE Security Reader

K11 Keypad

K11 and RMS-10 Wiring To RRE

The K11 Keypad extends the maximum cable length to the RRE from 25 feet (8 meters) to 500 feet (160 meters) by utilizing a Wiegand output. RMS-10 Mullion read-head may be added to the K-11 (Model IGR-K11WLGW) using RJ-45 telephone cables. (See Table A-13 for current part number information.) A built-in converter takes the magnetic stripe data from the RMS-10 and changes it into a Wiegand compatible (TTL) output. Use Figure 5-21, Figure 5-22, and Table 5-55 for pin-outs when attaching the supplied cable.

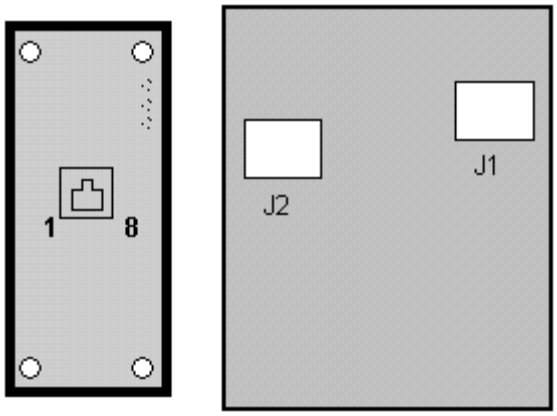


Figure 5-21: Rear View of the RMS-10, (left) and a Rear View of the K11 Keypad. (right)

K11 To RRE Wiring

J1 on K11	RJ45 Cable from J1 to RRE	Description
Pin 1	TB2-4	0V
Pin 2	TB2-6	Rcl (D1)
Pin 3	TB2-5	Rda (D0)
Pin 4	TB2-7	+5V
Pin 5	TB2-10	Green LED
Pin 6	TB2-9	Yellow LED
Pin 7	TB2-8	Red LED
Pin 8	TB2-11	Buzzer

Table 5-55: K11 To RRE Wiring

NOTE: If the K11 is not mounted on a grounded electrical box, the frame of the K11 must be connected to an earth ground wire (insert lug under lower left PCB mounting screw).

RRE Switch setting for K11

DIP Switch SW1	4	5
RRE01-E1L	ON	OFF
RRE-2, 4 ACU-R2 & ACU-R4	N/A	OFF

Table 5-56: RRE Switch setting for K11

Jumper configuration For Reader Support

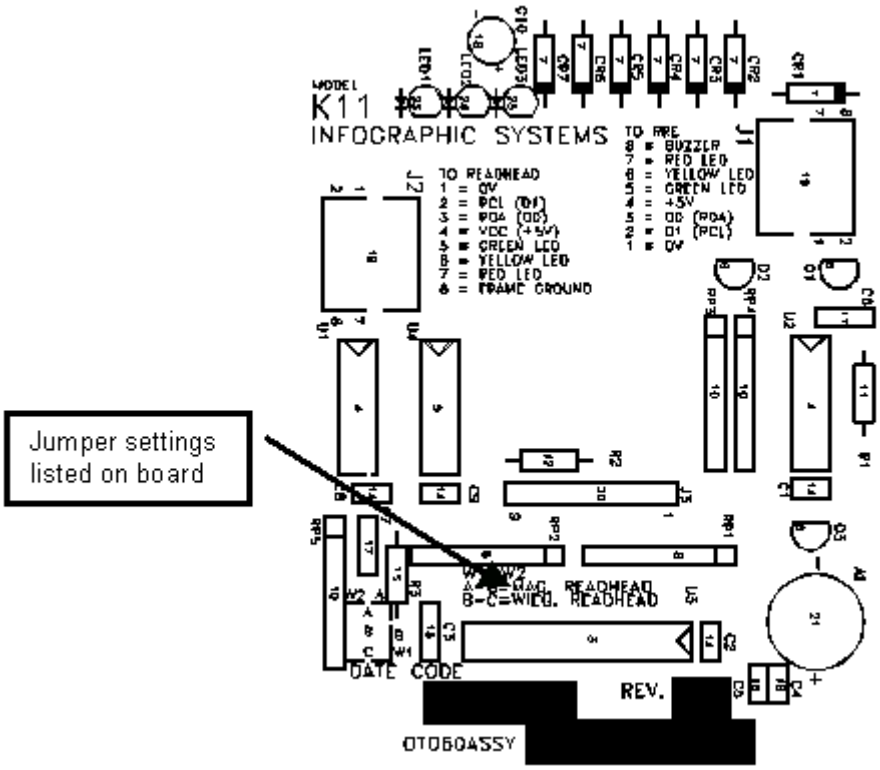


Figure 5-22: K11 Board only PN-IGR-K11WLGW with LEDs, PN-IGR-K11NLWG without LEDs

Jumper Configuration

If using a Magnetic read head, jumpers W1 and W2 should be set to position A-B.

If using a Wiegand read head, jumpers W1 and W2 should be set to position B-C.

The W1 and W2 jumpers only appear on K11 board PN- 135376-01 and 02 Rev-A and above or on assembled K11 Keypad revision B, PN-135375-01 and 02 Rev-B or above.

RMSC-11 IGS Smart Card Reader with K11 Keypad

The RMSC-11 is the RMSC-10 Mullion Smart Reader added to the K-11 Keypad (IGR-K11WLGW) using RJ-45 telephone cables (IGS PN-OTD60-134812-1 REV.A). Use Figure 5-23, Figure 5-22, and Table 5-57 for pin-outs when attaching the supplied cable.

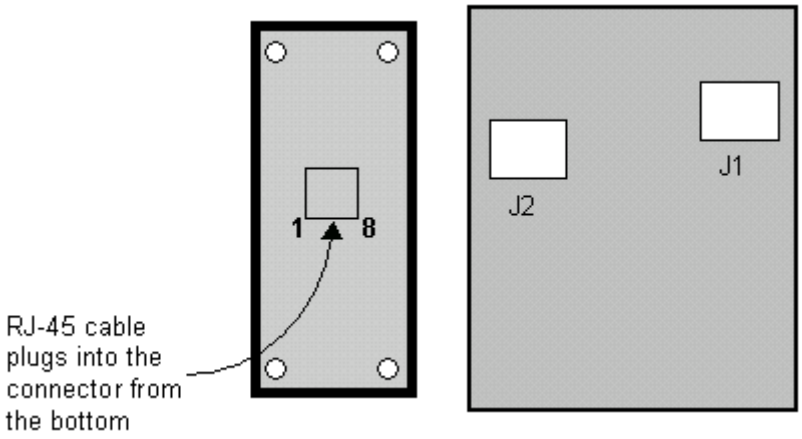


Figure 5-23: Rear View of the RMSC-10, (left) and a Rear View of the K11 Keypad. (right)

K11 To RRE Wiring

J1 on K11	RJ45 Cable from J1 to RRE	Description
Pin 1	TB2-4	0V
Pin 2	TB2-6	Rcl (D1)
Pin 3	TB2-5	Rda (D0)
Pin 4	TB2-7	+5V
Pin 5	TB2-10	Green LED
Pin 6	TB2-9	Yellow LED
Pin 7	TB2-8	Red LED
Pin 8	TB2-11	Buzzer

Table 5-57: K11 To RRE Wiring

NOTE: If the K11 is not mounted on a grounded electrical box, the frame of the K11 must be connected to an earth ground wire (insert lug under lower left PCB mounting screw).

RRE Switch setting for K11 when use with the RMSC-10 Reader

DIP Switch SW1	4	5
RRE01-E1L	OFF	ON
RRE-2, 4 ACU-R2 & ACU-R4	N/A	ON

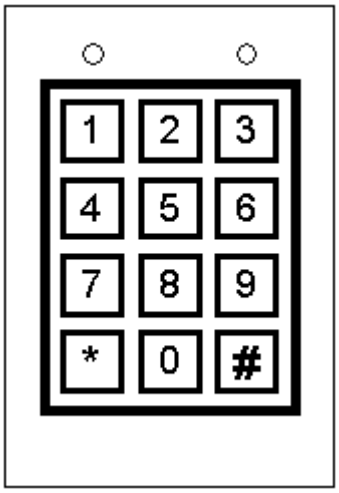
Table 5-58: RRE Switch setting for K11 when used with the RMSC-10 Reader

K12 (ESSEX) X-Y (3x4) MATRIX TOUCHPAD Wiring To RRE

Refer to Table 5-10 through Table 5-13 for terminal identification. shows the wiring connections for the InfoGraphic K12 Part #134829 X-Y (3x4) Matrix Touchpad Keypad (Essex Model KTP-32335SN). See Table A-13 for current GE part number information.

Always follow the instructions that come with the reader.

See UL Specifications Section for additional information.



Color	Description	RRE
Red	Input Voltage	TB2-7 +5V
Black	Ground	TB2-4 0V
Pink	Red LED	TB2-8 Red
White	Green LED	TB2-10 Grn
Gray	Column 1	TB3-2 KC0
Violet	Column 2	TB3-4 KC1
Orange	Column 3	TB3-5 KC2
Brown	Row 1	TB3-3 KR0
Blue	Row 2	TB3-1 KR1
Green	Row 3	TB3-6 KR2
Yellow	Row 4	TB3-7 KR3

Table 5-59: Wiring K12 (Essex) X-Y (3x4) Matrix Keypad

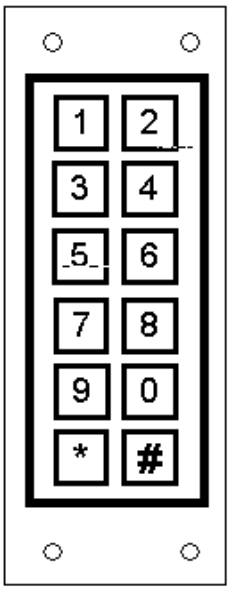
Figure 5-24: K12 (Essex) X-Y (3x4) Matrix Touchpad (PN 134829)

K14 (ESSEX) 2x6 Keypad Wiring To RRE

Refer to Table 5-10 through Table 5-13 for terminal identification. Table 5-60 shows the wiring connections for the InfoGraphic K14 Part #135657 2x6 Touchpad Keypad (Essex).

Always follow the instructions that come with the reader.

See UL Specifications Section for additional information



Color	Description	RRE
Red	Input Voltage	TB2-7 +5V
Black	Ground	TB2-4 0V
Green	Data 0	TB2-5 RDA
White	Data 1	TB2-6 RCL
Tan	Case Ground - connect to earth ground	

Table 5-60: Wiring K14 (Essex) 2x6 Keypad

Figure 5-25: K14 (Essex) 2x6 Keypad (PN 135657

Using 2x6 Keypad with the RMS10 for Alarm Masking

In order to utilize the K14 (Essex) 2x6 Thinline Keypad in conjunction with the RMS10 for Alarm Masking purposes, the following steps should be used.

1. Disconnect power to the RRE
2. Remove the PROM from the RRE-4.

NOTE: The notch in the end of the PROM faces the communications LED's

3. Place the new PROM labeled "RRE-4 AC D335" in the socket making sure to insert it with the notched end toward the communications status LED's.
4. Connect the green wire of the keypad to the terminal marked DATA 0. This wire will be connected to the same terminal with the RMS-10 DATA 0 wire.
5. Connect the white wire from the keypad to the terminal marked Data 1. This wire will be connected to the same terminal as the RMS-10 Data 1 wire.
6. Connect the red wire of the keypad to the +12V terminal. Configure the jumper on the back of the keypad for a 12-volt input.
7. Connect the black wire of the keypad to the 0V terminal of the RRE-4.

Please refer to the proper section of this manual for connecting the RMS-10.

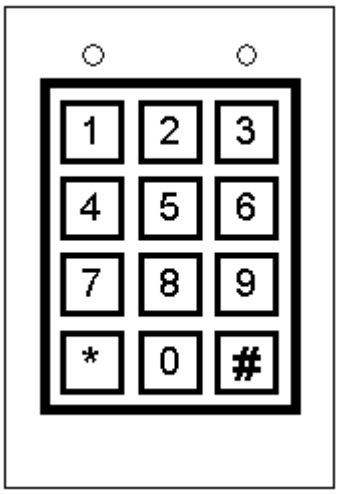
NOTE: The RRE-4 does not support the yellow WAIT LED. It is advisable to set the reader configuration option "Area Secure LED Option Blink" to blink when the security area is secure. This will let cardholders know to open the area, as there is no LCD display for feedback.

K13 (ESSEX) 26 Bit Wiegand TOUCHPAD Wiring To RRE

Refer to Table 5-10 through Table 5-13 for RRE terminal identification. Table 5-61 shows the wiring connections for the InfoGraphic K13 Part #135105 26 BIT Wiegand Touchpad Keypad (Essex). See Table A-13 for current GE part number information.

Always follow the instructions that come with the reader.

See UL Specifications Section for additional information.



Color	Description	RRE
Red	Input Voltage	TB2-7 +5V
Black	Ground	TB2-4 0V
Brown	Red LED	TB2-10 Grn
Green	Data 0	TB2-5 RDA
White	Data 1	TB2-6 RCL
Tan	Case Ground - connect to earth ground	

Table 5-61: Wiring K13 (Essex) 26 Bit Wiegand Keypad

Figure 5-26: K13 (Essex) 26 Bit Wiegand Touchpad (PN135105)

For any other wiring information refer to the Essex documentation that comes with the keypad.

SENSOR WR-1 Wiegand Read Head Output Wiring To RRE

Refer to Table 5-10 through Table 5-13 for RRE terminal identification. Table 5-62 shows wiring color code identification; use it as a guide for making the user-supplied cable.

See UL Specification's Section for additional information.

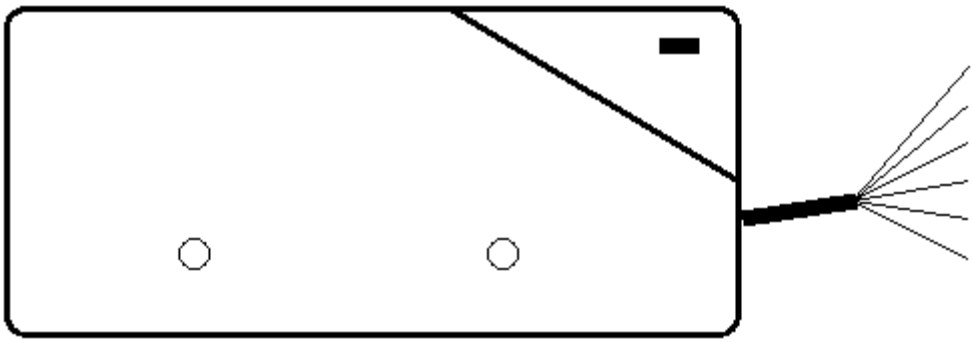


Figure 5-27: Front view of Sensor Wiegand reader

Wire Color Code	Description	Connection to RRE
Red	+5 Volts	TB2-7 (+5V)
Brown	LED	TB2-10 (Grn)
White	Data 1	TB2-6 (Rcl)
Green	Data 0	TB2-5 (Rda)
Black	Ground	TB2-4 (0V)
Blue	Data Hold	No Connection

Table 5-62: Wiegand Read Head to RRE

NOTE: On the Remote Reader Electronics board set SW1 Switch 5 to ON. See Figure 5-1.

RMS-10 IGS Magnetic Mullion Read Head Wiring To RRE

Refer to Table 5-10 through Table 5-13 for RRE terminal identification. Figure 5-31 shows the IGS Mullion reader and Table 5-63 shows the wiring connections. See Table 5-65 for DIP Switch settings for to the RRE. The RMS-10 reader draws 34 mA maximum.

See UL Specification's Section for additional information.

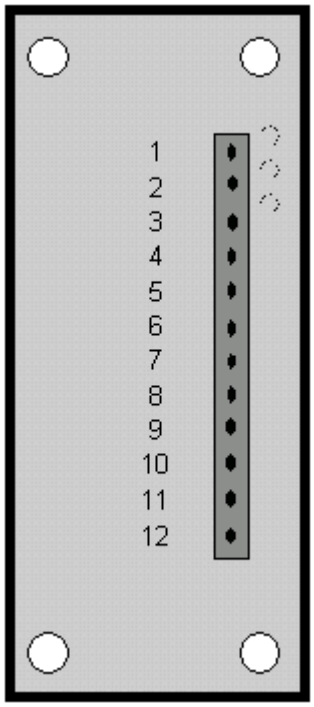


Figure 5-28: Rear view of IGS Mullion Reader.

Mullion	RRE	Description
Pin 1	TB2-8 (Red)	Red LED
Pin 2	TB2-9 (Yel)	Yellow LED
Pin 3	TB2-7 (+5V)	LED Common
Pin 4	TB2-10 (Grn)	Green LED
Pin 5	No Connections	Earth Ground
Pin 6	TB2-4 (0V)	0V
Pin 7	TB2-7 (+5V)	+5V
Pin 8	TB2-5 (Rda)	Data
Pin 9	TB2-6 (Rcl)	Clock
Pin 10	No Connection	
Pin 11	No Connection	Heater, If Used
Pin 12	No Connection	Heater, If Used

Table 5-63: IGS Mullion Reader to RRE

The reader can be installed up to a maximum cable distance of 12 feet (3.64 meters) from the RRE. If additional cable distance is required a Magstripe Extender (IGR-RMSMAG-EXT) can be used. See Table 5-65.

NOTES:

- Cable colors vary, Connect Reader as shown above
- The latest style of the RMS-10 Magnetic Mullion Reader uses a RJ-45 telephone connector instead of screw terminals.

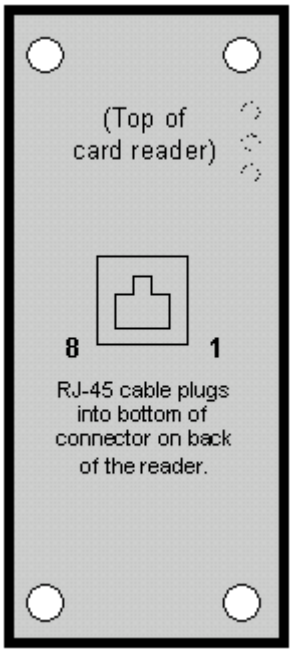


Figure 5-29: Rear view of new IGS Mullion Reader.

Mullion	RRE	Description
Pin 1	TB2-4 (0V)	0 V
Pin 2	TB2-6 (Rcl)	Clock
Pin 3	TB2-5 (Rda)	Data
Pin 4	TB2-7 (+5V)	+5V
Pin 5	TB2-10 (Grn)	Green LED
Pin 6	TB2-9 (Yel)	Yellow LED
Pin 7	TB2-8 (Red)	Red LED
Pin 8		Earth Ground

Table 5-64: New IGS Mullion Reader to RRE

RRE Switch SW1 must be set as shown below when the RMS-10 is connected to a K11 keypad or used with the magstripe extender.

Set RRE for Magstripe output

DIP Switch SW1	4	5
RRE01-E1L	ON	OFF
RRE-2, 4 ACU-R2 & ACU-R4	N/A	OFF

Table 5-65: RRE Switch Setting for RMS-10 With K11 or Magstripe Extender

RMSC-10 IGS Mullion Smart Card Read Head Wiring To RRE

Refer to Table 5-10 through Table 5-13 for RRE terminal identification. shows the IGS Mullion reader and shows the wiring connections and for DIP Switch settings for the RRE. The RMSC-10 reader draws 60 mA at 5V maximum. The RMSC-10 read head can be located up to 500 feet from the RRE using 18g wire.

See UL Specification's Section for additional information.

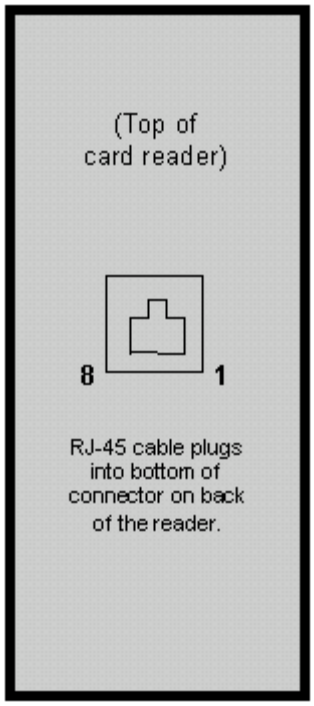


Figure 5-30: Rear view of IGS Mullion Smart Card Reader

Mullion	RRE	Description
Pin 1	TB2-4 (0V)	0 V
Pin 2	TB2-6 (Rcl)	Clock
Pin 3	TB2-5 (Rda)	Data
Pin 4	TB2-7 (+5V)	+5V
Pin 5	TB2-10 (Grn)	Green LED
Pin 6	TB2-9 (Yel)	Yellow LED
Pin 7	TB2-8 (Red)	Red LED
Pin 8		Frame Ground

Table 5-66: New IGS Mullion Reader to RRE

NOTE: Cable colors vary, Connect Reader as shown above

RRE Switch SW1 must be set as shown below when using the RMSC-10 reader

Set RRE for standard Wiegand output

DIP Switch SW1	4	5
RRE01-E1L	OFF	ON
RRE-2, 4 ACU-R2 & ACU-R4	N/A	ON

Table 5-67: RRE Switch setting when using RMSC-10 Reader

Set RRE for ABA Wiegand output

DIP Switch SW1	4	5
RRE01-E1L	ON	OFF
RRE-2, 4 ACU-R2 & ACU-R4	N/A	OFF

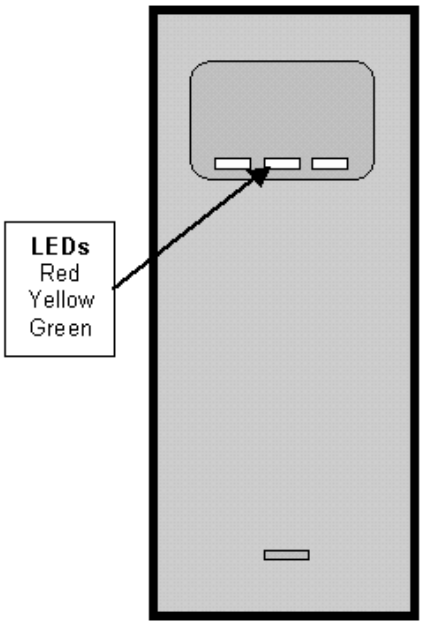


Figure 5-31: Front view of IGS Mullion Smart Card Reader

COTAG Read Head Wiring to RRE and ACU

Refer to Table 5-10 through Table 5-13 for RRE terminal identification. Table 5-68 though Table 5-70 shows the wiring connections for the Dual Zone controller to the RRE. Table 5-71 though Table 5-73 shows the wiring connections for the Single Zone controller to the RRE. Always follow wiring instructions that come with the Cotag reader.

We do not recommend powering the Cotag reader from the RRE. See UL Specification's Section for additional information.

Wiring Cotag Reader 280 to the 3321 Dual Zone Controller

Cotag Reader 280 TB1	3321 DZC Zone 1	Function
Pin 2 V+	Conn32 V	LED's common (+)
Pin 3 D1	Conn32 R-	Red LED (-)
Pin 4 D2	Conn32 A-	Amber LED (-)
Pin 5 D3	Conn32 G-	Green LED (-)
Pin 6 Rx-	Conn31 Rx-	Receive line
Pin 7 Rx	Conn31 Rx	Receive line
Pin 8 Tx-	Conn31 Tx-	Transmit line
Pin 9 Tx	Conn31 Tx	Transmit line

Table 5-68: Wiring Cotag Reader 280 to the 3321 Dual Zone Controller

NOTE: Do not jumper Rx and S, Tx and S on Conn31.

Wiring Cotag Reader 090 to the 3321 Dual Zone Controller

Cotag Reader 090	3321 DZC Zone 1	Function
Terminal 4	Conn35 V	LED's common (+)
Terminal 3	Conn35 G-	Green LED (-)
Terminal 6	Conn36 Rx-	Receive line
Terminal 5	Conn36 Rx	Receive line
Terminal 2	Conn36 Tx-	Transmit line
Terminal 1	Conn36 Tx	Transmit line

Table 5-69: Wiring Cotag Reader 090 to the 3321 Dual Zone Controller

Wiring the 3321 Dual Zone Controller to RRE

RRE	3321 DZC Zone 1	Function
TB2-10 (Grn)	Conn33 IN	Single Led
TB2-6 (Rcl)	Conn33 D1	Data 1
TB2-5 (Rda)	Conn33 D0	Data 0
TB2-4 (0 V)	Conn33 0V	GND

Table 5-70: Wiring the 3321 Dual Zone Controller to RRE

Wiring Cotag Reader 280 to the 3311 Single Zone Controller

280 Read Head	3311 SZC	Function
TB1-3 (D1)	Conn2 - 1 (R)	Red LED (-)
TB1-4 (D2)	Conn2 - 2 (A)	Amber LED (-)
TB1-5 (D3)	Conn2 - 3 (G)	Green LED (-)
TB1-2 (V+)	Conn2 - 4 (Va)	LED's common (+)
TB1-9 (Tx)	Conn2 - 8 (Tx)	Transmit line
TB1-8 (Tx-)	Conn2 - 9 (S)	Transmit line
TB1-6 (Rx-)	Conn2 - 10 (Ext)	Receive line
TB1-7 (Rx)	Conn2 - 11 (Rx)	Receive line

Table 5-71: Wiring Cotag Reader 280 to the 3311 Single Zone Controller.

Wiring Cotag Reader 090 to the 3311 Single Zone Controller

090 Read Head	3311 SZC	Function
Term 3	Conn2 - 3 (G)	Green LED (-)
Term 4	Conn2 - 4 (Va)	LED's common (+)
Term 2	Conn2 - 8 (Tx)	Transmit line
Term 1	Conn2 - 9 (S)	Transmit line
Term 5	Conn2 - 10 (Ext)	Receive line
Term 6	Conn2 - 11 (Rx)	Receive line

Table 5-72: Wiring Cotag Reader 090 to the 3311 Single Zone Controller.

NOTES:

1. Do not jumper Rx and S, Tx and S on Conn31.
2. Do not jumper D1 and S on Conn33.

Wiring the 3311 Single Zone Controller to RRE

RRE	3311 SZC	Function
TB2-10 (Grn)	Conn2-3 (G)	Single LED
TB2-6 (Rcl)	Conn3-4 (D1)	Data 1
TB2-5 (Rda)	Conn3-3 (D0)	Data 0
TB2-4 (Gnd)	Conn3-2 (0V)	GND

Table 5-73: Wiring the 3311 Single Zone Controller to RRE

NOTES:

1. Do not jumper D1 and S on Conn33.
2. On the Remote Reader Electronics board set SW1 Switch 5 to ON. See Figure 5-1.

Wiring Cotag Reader 5280 to the ACU and RRE

The following explains how to successfully hook-up and program a Cotag 5280 reader. This is a 280 read head with a 5311 interface in one unit. This is done in three parts. Part one is the physical wire/ hookup to the RRE/RRE4/ACU2-R2/ACU2-R4. Next the reader must be programmed; it must "learn" the features necessary for proper operation. Lastly, the software must be programmed correctly. Note that the Host controls the LEDs. Also, **do not install the cover on the reader until completely finished.**

WIRING

Follow recommended gauge sizes for distance. That is, 7 conductor, 18 AWG loose bundle of stranded conductors with an overall shield for a maximum 400 ft. run, 22 AWG for a maximum run of about 220 feet.

Wiring Cotag Reader 5280 to the RRE

5280	Function	RRE Terminal	
0V	- DC	0V	TB2 pin 4
VIN	10.7 – 15.6V DC @ 0.5 amps	12V	TB1 pin 3
D0	Wiegand data 0	RDA	TB2 pin 5
D1	Wiegand data 1	RCL	TB2 pin 6
R	Red LED	RED	TB2 pin 8
G	Green LED	GRN	TB2 pin 9
A	Yellow LED	YEL	TB2 pin 10
	Shield (do not connect at reader)	0V	TB2 pin 4

Table 5-74: Wiring Cotag Reader 5280 to the RRE

Wiring Cotag Reader 5280 to the ACU2, ACU-R2 and ACU-R4

5280	Function	ACU2, ACU2-R2 or ACU2-R4	
0V	- DC		The maximum 12V available from any of these is 1.0 amp. It is recommended a separate 12V supply be used in this case. This should be capable of at least 2.0 amps.
VIN	10.7 – 15.6V DC @ 0.5 amps		
D0	Wiegand data 0	Data 0	
D1	Wiegand data 1	Data 1	
R	Red LED	Red	
G	Green LED	Green	
A	Yellow LED	Yellow	
	Shield (do not connect at reader)	0V	

Table 5-75: Wiring Cotag Reader 5280 to the ACU2, ACU-R2 and ACU-R4

Notes for Dual Zone Controller

At Power Up:

- The Zone 1 Status Led will flash a number of times indicating the first identification number of the data interface programmed into the EPROM.
- Then the Zone 2 Status Led will flash a number of times indicating the second identification number of the data interface programmed into the EPROM.
- When this process is complete, both Status LED’s flash together once and then the green Power-WD LED starts to flicker indicating that the controller has started polling the zones.

After Power Up:

- The Power -WD and RX1 LED will flicker.
- As the Card comes within the range, the zone 1 RX1 LED will glow more brightly.

- As the Card starts being read, the Power-WD LED will stop flickering and glow steadily for half a second.
- If the Card code is valid then the zone 1 Data LED will light.

Notes for Single Zone Controller 3311

The switches on the 3311 must be set as follows:

J1: RLYINT	J2: R=INT	J3: A=INT	J4: G=EXT
J5: G=NRM	J6: D0=T	J7: D1=T	J8: V0=VL
J9: =A	J10: =A		
SW1 = 0	SW2 = 0	SW3 = 0	SW4 = 0
SW5 = 1	SW6 = 2		

Prom must be 2/10.7C IF7.92

"LP1 TX" LED should be flashing brightly

"LP2 RX" LED should light when a card is presented to the reader.

The "LP5 OP" will light when a valid card is read.

Cryptag Reader Head Wiring To RRE-2 and RRE-4

Table 5-76 shows the connections between the Cryptag Census card reader and the RRE-4.

Cryptag Census Reader Terminal	Description	1st Reader	2nd Reader	3rd Reader	4th Reader
+V	+12 Volts	TB2-5 or 6	TB2-5 or 6	TB2-5 or 6	TB2-5 or 6
GREEN	LED	TB1-11	TB2-11	TB3-11	TB4-11
DAT/D1	Data 1	TB1-9	TB2-9	TB3-9	TB4-9
CLK/D0	Data 0	TB1-8	TB2-8	TB3-8	TB4-8
0V	Ground	TB1-7	TB2-7	TB3-7	TB4-7
Buzzer	Buzzer	No Connection	No Connection	No Connection	No Connection

Table 5-76: Wiring Cryptag Reader to the RRE-4

NOTE: Refer to the Cryptag Reader Manual for detailed information on installation of antennas. Cryptag Reader comes with resistors and capacitors to tune the antenna.

HID MiniProx Model 5365 Reader to RRE

Refer to Table 5-10 through Table 5-13 for RRE terminal identification. Table 5-77 shows the wiring connections to the RRE. See Table A-13 for current part number information. See UL Specification's Section for additional information.

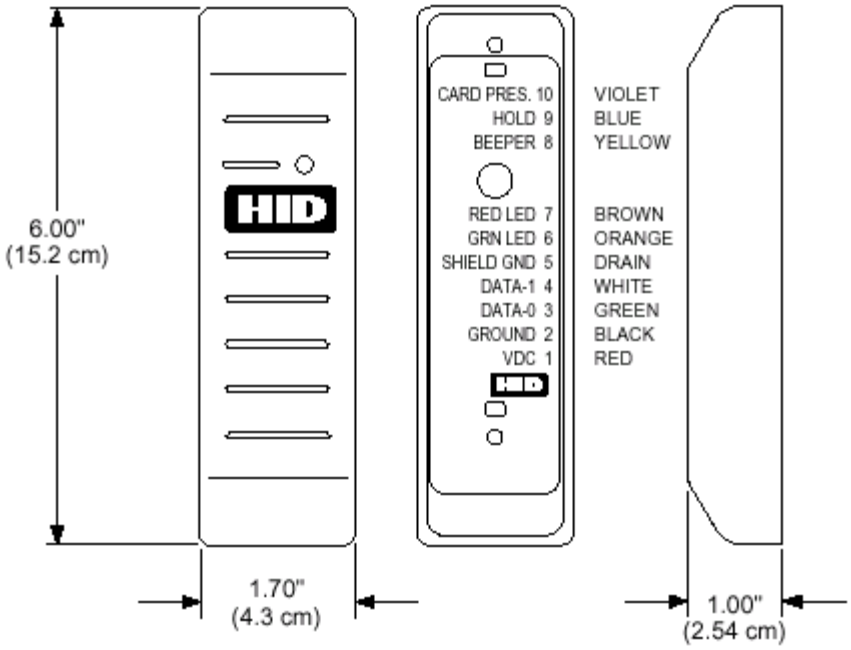


Figure 5-32: HID MiniProx 5365

Reader Wire Color	Description	Connection to RRE
Red	+12 Volts	TB1-3 (12V)
Black	Ground	TB2-4 (0 V)
Green	Data 0	TB2-5 (Rda)
White	Data 1	TB2-6 (Rcl)
Shield	Ground	Earth Ground
Orange	Green LED	TB2-10 (Grn)
Brown	Red LED	TB2-8 (Red)
Yellow	Beeper	TB2-11 (Buz)
Blue	Data Hold	No Connection
Violet	Card Present	No Connection

Table 5-77: Wiring HID MiniProx Model 5365 Reader to the ACU

NOTE: Shield must be connected to earth ground at one end only.

The reader can be installed up to a maximum cable distance of 500 feet (152 meters) from the RRE.

HID MiniProx Reader Model 5363 and 5364 to RRE

Refer to Table 5-10 through Table 5-13 for terminal identification. Table 5-78 shows the wiring connections for the HID MiniProx Model 5363 (12 Volt) to the RRE. Table 5-79 shows the wiring connections for the HID MiniProx Model 5364 (5 Volt) to the RRE. See UL Specification's Section for additional information.

MiniProx Reader Wire Color	Description	Connection to RRE
Red	+12 Volts	TB1-3 (12V)
Black	Ground	TB2-4 (0 V)
Green	Data 0	TB2-5 (Rda)
White	Data 1	TB2-6 (Rcl)
Shield	Shield	Earth Ground
Orange	Green LED	TB2-10 (Grn)
Brown	Red LED	TB2-8 (Red)
Yellow	Beeper	TB2-11 (Buz)
Blue	Data Hold	No Connection

Table 5-78: Wiring HID MiniProx Model 5363 Reader to the RRE

MiniProx Reader Wire Color	Description	Connection to RRE
Red	+5 Volts	TB2-7 (+5V)
Black	Ground	TB2-4 (0 V)
Green	Data 0	TB2-5 (Rda)
White	Data 1	TB2-6 (Rcl)
Shield	Shield	Earth Ground
Orange	Green LED	TB2-10 (Grn)
Brown	Red LED	TB2-8 (Red)
Yellow	Beeper	TB2-11 (Buz)
Blue	Data Hold	No Connection

Table 5-79: Wiring HID MiniProx Model 5364 Reader to the RRE

NOTES:

- On the Remote Reader Electronics board set SW1 Switch 5 to ON. See Figure 5-1.
- Shield must be connected to earth ground at one end only.

The reader can be installed up to a maximum cable distance of 500 feet (152 meters) from the RRE.

HID ProxPro Model 5355 to Read Head RRE

Refer to Table 5-10 through Table 5-13 for RRE terminal identification. Table 5-80 shows the wiring connections to the RRE. See UL Specification's Section for additional information.

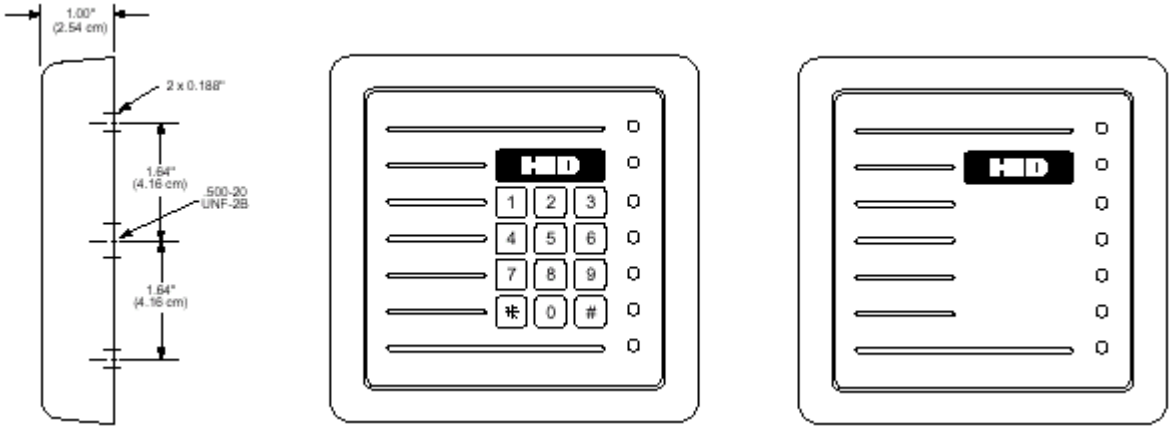


Figure 5-33: HID ProxPro PR-5355 With Keypad and PK-5355 Without Keypad

ProxPro Reader	Description	Connection to RRE
TB1-1	+12 Volts	TB1-3 (12V)
TB1-2	Ground	TB2-4 (0 V)
TB1-3	Data 0	TB2-5 (Rda)
TB1-4	Data 1	TB2-6 (Rcl)
TB1-5	Ground	Earth Ground
TB1-6	Green LED	TB2-10 (Grn)
TB1-7	Red LED	TB2-8 (Red)
TB1-8	Beeper	TB2-11 (Buz)
TB1-9	Data Hold	No Connection
TB1-10	Tamper Common	TB3-9 (0 V)
TB1-11	Tamper	TB3-8 (Tam)

Table 5-80: Wiring HID ProxPro Model 5355 Reader to the RRE

The reader can be installed up to a maximum cable distance of 500 feet (152 meters) from the RRE.

NOTE: Shield must be connected to earth ground at one end only.

Switches on HID ProxPro reader:

DIP Switch:

1	On	Identifies unit as Wiegand
2	On	Turns on Beeper
3	Off	Control Green LED by Host
4	On	Keypad Data through Data lines
5	On	2 Wire LED Control
6	On	Common Ground to Data lines
7	On	Common Ground to Data lines
8	On	Common Ground to Data lines

Jumpers:

P1 Jumper 1-2 when mounting on a metallic surface otherwise jumper 2-3.
P3 Jumper 1-2 (Normally Open tamper switch).

LED Operation

Red:	Ready to read card.
OFF:	Prompting User for PIN number.
Green:	Access was granted or door is unlocked.
Red Flashing:	Access was denied or reader is in alarm

NOTE: The keypad will only work if the unit is fully assembled before the unit is powered-up.

ThinLine Model 5395 and ProxPro II Model 5455 to Read Head RRE

Refer to Table 5-10 through Table 5-13 for RRE terminal identification. Table 5-81 shows the wiring connections to the RRE. See UL Specification's Section for additional information.

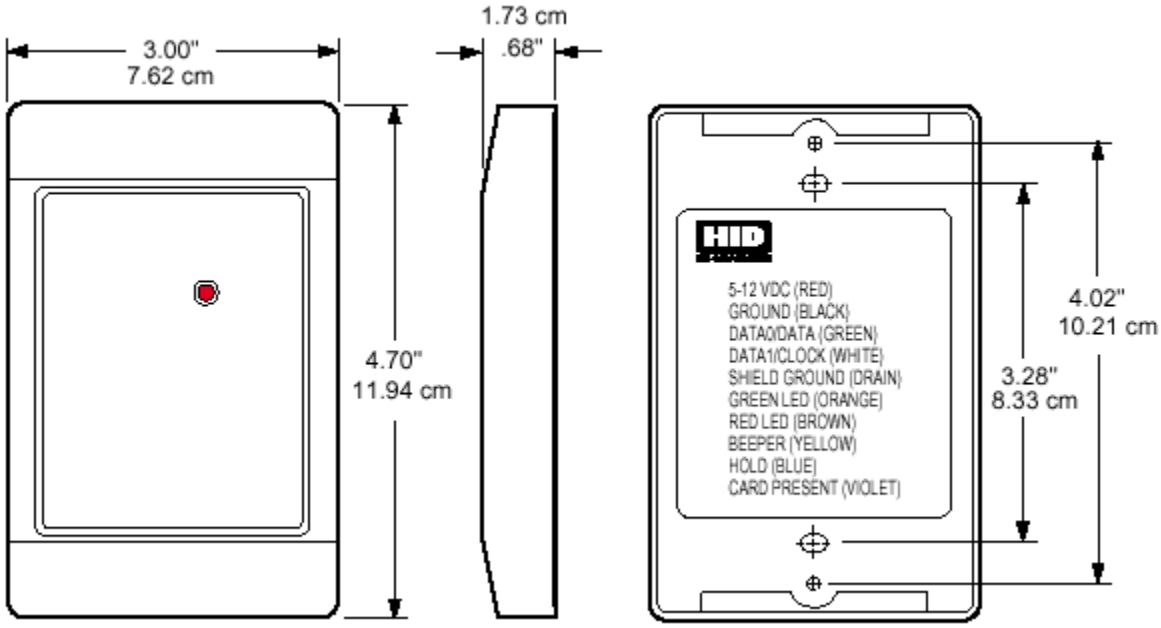


Figure 5-34: HID ThinLine 5395

MiniProx Reader Wire Color	Description	Connection to RRE
Red	+12 Volts	TB1-3 (12V)
Black	Ground	TB2-4 (0 V)
Green	Data 0	TB2-5 (Rda)
White	Data 1	TB2-6 (Rcl)
Shield	Shield	Earth Ground
Orange	Green LED	TB2-10 (Grn)
Brown	Red LED	TB2-8 (Red)
Yellow	Beeper	TB2-11 (Buz)
Blue	Data Hold	No Connection

Table 5-81: Wiring HID ThinLine Model TL-5395 and ProxPro II Model 5455 Reader to the RRE

The reader can be installed up to a maximum cable distance of 500 feet (152 meters) from the RRE.

NOTE: Shield must be connected to earth ground at one end only.

HID ProxPoint Plus 6005 to the RRE

Refer to Table 5-10 through Table 5-13 for RRE terminal identification. Table 5-82 shows the wiring connections to the RRE. See UL Specification's Section for additional information.

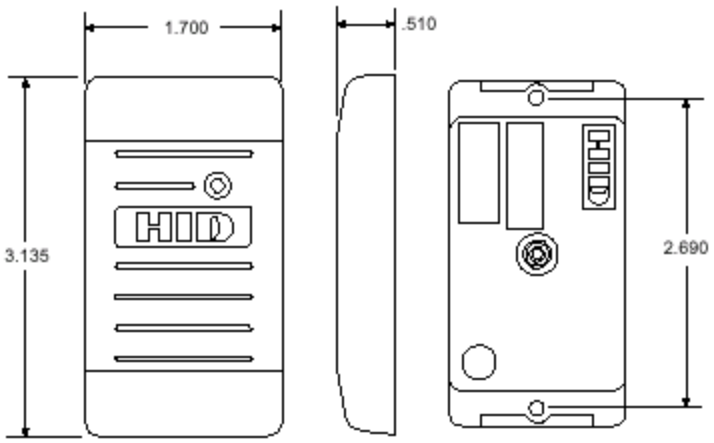


Figure 5-35: HID ProxPoint Plus 6005

Reader Wire Color	Description	Connection to RRE
Red	+12 Volts	TB1-3 (12V)
Black	Ground	TB2-4 (0 V)
Green	Data 0	TB2-5 (Rda)
White	Data 1	TB2-6 (Rcl)
Shield	Shield Ground	Earth Ground
Orange	Green LED	TB2-10 (Grn)
Brown	Red LED	TB2-8 (Red)
Yellow	Beeper	TB2-11 (Buz)
Blue	Data Hold	No Connection
Violet	Card Present	No Connection

Table 5-82: Wiring HID Reader to the RRE

The reader can be installed up to a maximum cable distance of 500 feet (152 meters) from the RRE.

NOTE: Shield must be connected to earth ground at one end only.

INDALA Proximity Reader Model ASR-112 and ASR-142 to RRE

Refer to Table 5-10 through Table 5-13 for terminal identification. Table 5-83 shows the wiring connections for the Indala ASR-110 and ASR 112 readers to the RRE. Table 5-84 shows the wiring connections for the Indala ASR-142 reader to the RRE.

Always follow the instructions that come with the Indala reader.

See UL Specification's Section for additional information.

Indala ASR-110 or ASR 112	Description	Connection to RRE
Red	+12 VDC	TB1-3 (12V)
Black	Ground	TB2-4 (0 V)
Green	Data 0	TB2-5 (Rda)
White	Data 1	TB2-6 (Rcl)
Blue	Beeper	TB2-11 (Buz)
Orange	Green LED	TB2-10 (Grn)
Brown	Red LED	TB2-8 (Red)

Table 5-83: Wiring ASR-110 or ASR-112 to the RRE

Indala ASR-142	Description	Connection to RRE
TB2-10	+12 VDC	TB1-3 (12V)
TB2-9	Ground	TB2-4 (0 V)
TB2-5	Data 0	TB2-5 (Rda)
TB2-4	Data 1	TB2-6 (Rcl)
TB2-6	Beeper	TB2-11 (Buz)
TB2-7	Green LED	TB2-10 (Grn)
TB2-8	Red LED	TB2-8 (Red)

Table 5-84: Wiring ASR-142 to the RRE

NOTE: On the Remote Reader Electronics board set SW1 Switch 5 to ON. See Figure 5-1.

MR-10 (RMS-18) Read Head Wiring To RRE

Refer to Table 5-10 through Table 5-13 for RRE terminal identification. Table 5-85 shows the wiring connections for the MR-10 reader to the RRE.

Always follow the instructions that come with the MR-10 reader.

See UL Specification's Section for additional information.

MR-10 Reader	Description	Connection to RRE
Pin 1 (Red)	+5 VDC	TB2-7 (+5V)
Pin 2 (Green)	Data 0	TB2-5 (Rda)
Pin 3 (White)	Data 1	TB2-6 (Rcl)
Pin 4 (Brown)	Green LED	TB2-10 (Grn)
Pin 5 (Orange)	Beeper	TB2-11 (Buz)
Pin 6 (Black)	Ground	TB2-4 (0 V)

Table 5-85: Wiring MR-10 Read Head to the RRE

Notes for MR-10 (RMS-18) Reader

Switches on Reader Itself:

There are 4 switches inside the reader. You must remove 3 screws to get to switches. The switches are located on the piggyback board opposite the telephone jack inside the reader. The switches must be set as follows:

Switches 1 & 2 set to **OFF**
Switches 3 & 4 set to **ON**

RRE Switch SW1 must be set as shown in Table 5-86 when using the RMS-18 reader.

DIP Switch SW1	4	5
Standard Wiegand format	OFF	ON
ABA Wiegand format (Format 7)	ON	OFF

Table 5-86: RRE Switch setting when using RMS-18 (MR-10) Reader

NOTE: ABA Wiegand mode is required when ever cards are being used with an encoded number is 65,535 or higher.

Keri Read Head P-300, P-500 and P-600

Refer to Table 5-10 through Table 5-13 for RRE terminal identification. The tables show the wiring color code identification. See Table A-13 for current GE part number information.

Figure 5-36 shows a wiring diagram for installing the filter that is required for the Keri reader. The reader and filter have pigtail connections. It is recommended that all splices be soldered and wrapped in heat shrink or crimp style connectors be used. **Filter must be install at the reader**.

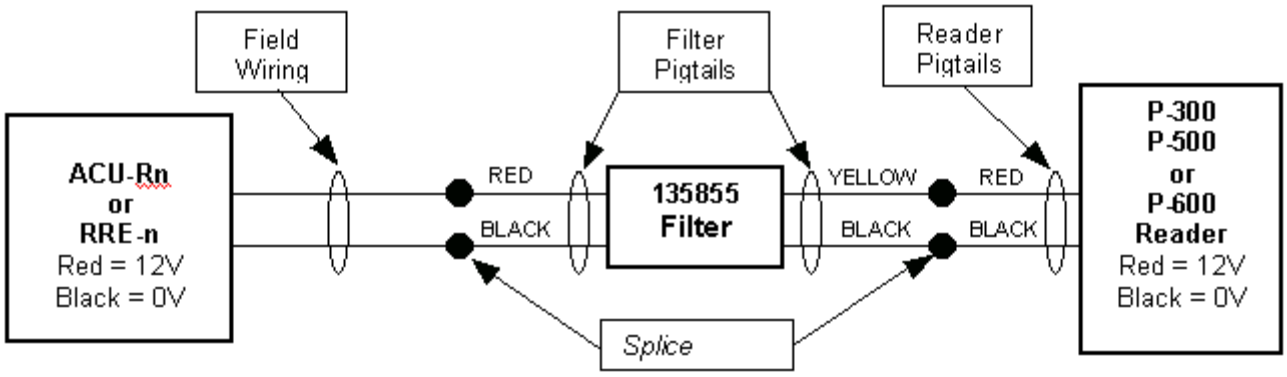


Figure 5-36: Block diagram of Filter Hook-up.

Wiring P-300/P-500/P-600 Read Head to RRE-4

Wire Color	Description	1st Reader	2nd Reader	3rd Reader	4th Reader
See Figure 5-36	+12 VDC	TB2-5 or 6 (+12V)	TB2-5 or 6 (+12V)	TB2-5 or 6 (+12V)	TB2-5 or 6 (+12V)
See Figure 5-36	0 V	TB1-7 (0V)	TB2-7 (0V)	TB3-7 (0V)	TB4-7 (0V)
Brown	Red LED	TB1-10 (RED LED)	TB2-10 (RED LED)	TB3-10 (RED LED)	TB4-10 (RED LED)
White	Data 1	TB1-9 (D1)	TB2-9 (D1)	TB3-9 (D1)	TB4-9 (D1)
Green	Data 0	TB1-8 (D0)	TB2-8 (D0)	TB3-8 (D0)	TB4-8 (D0)
Shield	Shield	TB1-7 (0V)	TB2-7 (0V)	TB3-7 (0V)	TB4-7 (0V)
Orange	Green LED	No Connection	No Connection	No Connection	No Connection
Blue	Beeper	No Connection	No Connection	No Connection	No Connection

Table 5-87: P-300/P-500/P-600 Read Head to RRE-4

Wiring P-300/P-500/P-600 Read Head to RRE or S-22

Wire Color	Description	RRE	S-22
See Figure 5-36	+12 VDC	TB1-3 (+12V)	TB3 -1 (+12V)
See Figure 5-36	0 V	TB2-4 (0V)	TB3- 3 (0V)
Brown	Red LED	TB2-8 (RED)	TB4- 1 (RED)
White	Data 1	TB2-6 (RCL)	TB1- 3 (CLK)
Green	Data 0	TB2-5 (RDA)	TB1- 2 (DAT)
Shield	Shield	TB2-4 (0V)	TB3- 3 (0V)
Orange	Green LED	No Connection	No Connection
Blue	Beeper	No Connection	No Connection

Table 5-88: P-300/P-500/P-600 Read Head to RRE or S-22

Wire Color	Description	1st Reader	2nd Reader	3rd Reader	4th Reader
See Figure 5-36	+12 VDC	TB3-12 (+12V)	TB3-12 (+12V)	See RRE for additional reader hook-up	
See Figure 5-36	0 V	TB3-11 (0V)	TB3-11 (0V)		
Brown	Red LED	TB3-21 (R0RD)	TB3-7 (R1RD)		
White	Data 1	TB3-23 (R0D1)	TB3-9 (R1D1)		
Green	Data 0	TB3-24 (R0D0)	TB3-10 (R1D1)		
Shield	Shield	TB3-14 (0V)	TB3-14 (0V)		
Orange	Green LED	No Connection	No Connection		
Blue	Beeper	No Connection	No Connection		

Table 5-89: P-300/P-500/P-600 Read Head to ACU-R2 (TB3, green connector)

Wire Color	Description	1st Reader	2nd Reader	3rd Reader	4th Reader
See Figure 5-36	+12 VDC	TB3-12 (+12V)	TB3-12 (+12V)	TB4-12 (+12V)	TB4-12 (+12V)
See Figure 5-36	0 V	TB3-11 (0V)	TB3-11 (0V)	TB4-11 (0V)	TB4-11 (0V)
Brown	Red LED	TB3-21 (R0RD)	TB3-7 (R1RD)	TB4-21 (R2RD)	TB4-7 (R3RD)
White	Data 1	TB3-23 (R0D1)	TB3-9 (R1D1)	TB4-23 (R2D1)	TB4-9 (R3D1)
Green	Data 0	TB3-24 (R0D0)	TB3-10 (R1D0)	TB4-24 (R2D0)	TB4-10 (R3D1)
Shield	Shield	TB314 (0V)	TB3-14 (0V)	TB4-14 (0V)	TB4-14 (0V)
Orange	Green LED	No Connection	No Connection	No Connection	No Connection
Blue	Beeper	No Connection	No Connection	No Connection	No Connection

Table 5-90: P-300/P-500/P-600 Read Head to ACU-R4 (TB3, green connector and TB4, blue connector)

NOTES:

- The beeper output is not supported; the reader's built-in beeper provides the noise.
- Use the brown wire for Red LED; the green LED function is provided from the reader.
- Pin numbers are read bottom to top, right to left; the exception is the RRE04-E1L which has the pin numbers printed on the termination board.

NOTES: SPECIFIC TO THE P-600:

- The reader comes with Single LED control as default. Use the LED Mode Control Card part no. 135950 (Keri part no. 05528-702) to change the LED output to Dual LED control. This is described in the P-600 Hookup Guide.
- The keypad portion defaults to 8-bit burst mode. This is the proper mode of operation.
- For this type of reader, attach the Orange wire of the P-600 pigtail to the Green LED output on any RRE, RRE-4 ACU-R2/R4 or RRE-2.
- A Forced Open alarm is indicated by a blinking orange color in the LED locations on the reader (the "horns").
- The prompt to enter a PIN number is indicated by the red LED turning off when a card is presented at the reader.
- Use Standard 26 bit Wiegand format in the reader configuration. Card and PIN can use cards with different Company/Facility codes. If the card is entered directly through the keypad, the system uses only the Company/ Facility code, which is in the Site configuration.

SECURAKEY Read Head Wiring To RRE

Refer to Table 5-10 through Table 5-13 for RRE terminal identification. Table 5-91 shows the wiring connections for the SecuraKey reader to the RRE. Always follow the instructions that come with the SecuraKey reader.

See UL Specification's Section for additional information.

SecuraKey Model SK-028C	Description	Connection to RRE
Red	+12 VDC	TB1-3 (12V)
Black	Ground	TB2-4 (0 V)
Green	Data 0	TB2-5 (Rda)
White	Data 1	TB2-6 (Rcl)
Brown	Green LED	TB2-10 (Grn)

Table 5-91: Wiring SecuraKey Read Head to the RRE

NOTE: On the Remote Reader Electronics board set SW1 Switch 5 to ON. See Figure 5-1.

DORADO Read Head Wiring To RRE

Refer to Table 5-10 through Table 5-13 for terminal identification. Table 5-92 shows the wiring connections for the Dorado reader to the RRE.

Always follow the instructions that come with the Dorado reader.

See UL Specification's Section for additional information.

Dorado Model 544B or 644B	Description	Connection to RRE
Red	+5 VDC	TB2-7 (+5V)
Black	Ground	TB2-4 (0 V)
Green	Data 0	TB2-5 (Rda)
White	Data 1	TB2-6 (Rcl)
Brown	Green LED	TB2-10 (Grn)
Yellow	Red LED	TB2-8 (Red)

Table 5-92: Wiring Dorado Read Head to the RRE

Option Switch

A	B	C	D
On	On	Off	Off

NOTE: On the Remote Reader Electronics board set SW1 Switch 5 to ON See Figure 5-1.

Reader and Keypad Connection to RRE-4

SENSOR WR-1 Wiegand Read Head Output Wiring

Refer to Table 5-40 through Table 5-44 for terminal identifications. Table 5-93 shows wiring color code identification; use it as a guide for making the user-supplied cable.

See UL Specification's Section for additional information.

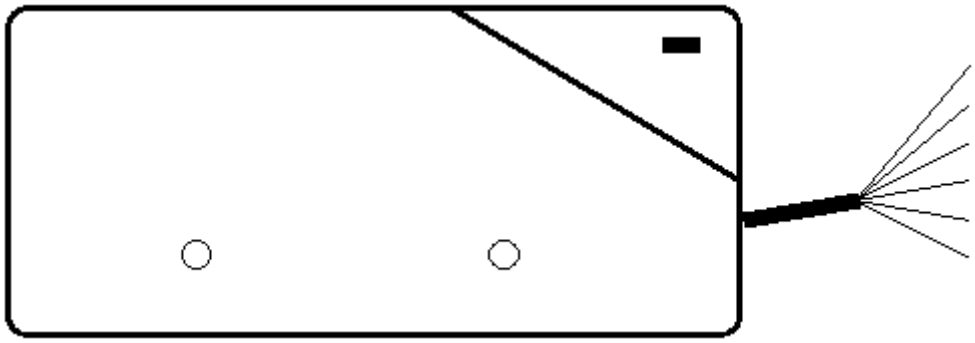


Figure 5-37: Front view of Sensor Wiegand reader

Wiring Wiegand Read Head to RRE-4

Wire Color Code	Description	1st Reader	2nd Reader	3rd Reader	4th Reader
Red	+5 Volts	TB2-3 or 4	TB2-3 or 4	TB2-3 or 4	TB2-3 or 4
Brown	LED	TB1-11	TB2-11	TB3-11	TB4-11
White	Data 1	TB1-9	TB2-9	TB3-9	TB4-9
Green	Data 0	TB1-8	TB2-8	TB3-8	TB4-8
Black	Ground	TB1-7	TB2-7	TB3-7	TB4-7
Blue	Data Hold	No Connection	No Connection	No Connection	No Connection

Table 5-93: Wiegand Read Head to RRE-4

NOTE: On the Remote Reader Electronics board set SW1 Switch 5 to ON. See Figure 5-1.

COTAG Read Head

Refer to Table 5-40 through Table 5-44 for RRE-4 terminal identification. Table 5-94 though Table 5-96 shows the wiring connections for the Dual Zone Controller to the RRE-4. Table 5-97 though Table 5-99 shows the wiring connections for the Single Zone Controller to the RRE-4. Always follow wiring instructions that come with the Cotag reader.

We do not recommend powering the Cotag reader from the RRE-4.

See UL Specification's Section for additional information.

Wiring Cotag Reader 280 to the 3321 Dual Zone Controller

Cotag Reader 280 TB1	3321 DZC Zone 1	Function
Pin 2 V+	Conn32 V	LED's common (+)
Pin 3 D1	Conn32 R-	Red LED (-)
Pin 4 D2	Conn32 A-	Amber LED (-)
Pin 5 D3	Conn32 G-	Green LED (-)
Pin 6 Rx-	Conn31 Rx-	Receive line
Pin 7 Rx	Conn31 Rx	Receive line
Pin 8 Tx-	Conn31 Tx-	Transmit line
Pin 9 Tx	Conn31 Tx	Transmit line

Table 5-94: Wiring Cotag Reader 280 to the 3321 Dual Zone Controller

NOTE: Do not jumper Rx and S, Tx and S on Conn31.

Wiring Cotag Reader 090 to the 3321 Dual Zone Controller

Cotag Reader 090	3321 DZC Zone 1	Function
Terminal 4	Conn35 V	LED's common (+)
Terminal 3	Conn35 G-	Green LED (-)
Terminal 6	Conn36 Rx-	Receive line
Terminal 5	Conn36 Rx	Receive line
Terminal 2	Conn36 Tx-	Transmit line
Terminal 1	Conn36 Tx	Transmit line

Table 5-95: Wiring Cotag Reader 090 to the 3321 Dual Zone Controller

NOTE: Do not jumper Rx and S, Tx and S on Conn31.

Wiring the 3321 Dual Zone Controller to the RRE-4

3321 DZC Zone 1 Data	Description	1st Reader	2nd Reader	3rd Reader	4th Reader
Conn 33 IN	LED	TB1-11	TB2-11	TB3-11	TB4-11
Conn 33 D1	Data 1	TB1-9	TB2-9	TB3-9	TB4-9
Conn 33 D0	Data 0	TB1-8	TB2-8	TB3-8	TB4-8
Conn 33 0V	Ground	TB1-7	TB2-7	TB3-7	TB4-7

Table 5-96: Wiring the 3321 Dual Zone Controller to the RRE-4

NOTE: On the Remote Reader Electronics board set SW1 Switch 5 to ON. See Figure 5-1.

Wiring Cotag Reader 280 to the 5311 Single Zone Controller

280 Read Head	3311 SZC	Function
TB1-3 (D1)	Conn2 - 1 (R)	Red LED (-)
TB1-4 (D2)	Conn2 - 2 (A)	Amber LED (-)
TB1-5 (D3)	Conn2 - 3 (G)	Green LED (-)
TB1-2 (V+)	Conn2 - 4 (Va)	LED's common (+)
TB1-9 (Tx)	Conn2 - 8 (Tx)	Transmit line
TB1-8 (Tx-)	Conn2 - 9 (S)	Transmit line
TB1-6 (Rx-)	Conn2 - 10 (Ext)	Receive line
TB1-7 (Rx)	Conn2 - 11 (Rx)	Receive line

Table 5-97: Wiring Cotag Reader 280 to the 3311 Single Zone Controller.

Wiring Cotag Reader 090 to the 5311 Single Zone Controller

090 Read Head	3311 SZC	Function
Term 3	Conn2 - 3 (G)	Green LED (-)
Term 4	Conn2 - 4 (Va)	LED's common (+)
Term 2	Conn2 - 8 (Tx)	Transmit line
Term 1	Conn2 - 9 (S)	Transmit line
Term 5	Conn2 - 10 (Ext)	Receive line
Term 6	Conn2 - 11 (Rx)	Receive line

Table 5-98: Wiring Cotag Reader 090 to the 5311 Single Zone Controller.

Wiring the 5311 Single Zone Controller to the RRE-4

3311 SZC Zone 1 Data	Description	1st Reader	2nd Reader	3rd Reader	4th Reader
Conn2–3 (G)	LED	TB1-11	TB2-11	TB3-11	TB4-11
Conn3-4 (D1)	Data 1	TB1-9	TB2-9	TB3-9	TB4-9
Conn3-5 (D0)	Data 0	TB1-8	TB2-8	TB3-8	TB4-8
Conn 3-2 (0V)	Ground	TB1-7	TB2-7	TB3-7	TB4-7

Table 5-99: Wiring the 5311 Single Zone Controller to the RRE-4

NOTES:

- Do not jumper D1 and S on Conn33.
- On the Remote Reader Electronics board set SW1 Switch 5 to ON. See Figure 5-1.

Wiring Cotag Reader 5280 to the ACU and RRE-4

The following explains how to successfully hook-up and program a Cotag 5280 reader. This is a 280 read head with a 5311 interface in one unit. This is done in three parts. Part one is the physical wire/ hookup to the RRE/RRE4/ACU2-R2/ACU2-R4. Next the reader must be programmed; it must “learn” the features necessary for proper operation. Lastly, the software must be programmed correctly. Note that the Host controls the LEDs. Also, **do not install the cover on the reader until completely finished.**

WIRING

Follow recommended gauge sizes for distance. That is, 7 conductor, 18 AWG loose bundle of stranded conductors with an overall shield for a maximum 400 ft. run, 22 AWG for a maximum run of about 220 feet.

Wiring Cotag Reader 5280 to the RRE

5280	Function	RRE 4
0V	- DC	0V
VIN	10.7 – 15.6V DC @ 0.5 amps	12V
D0	Wiegand data 0	RDA
D1	Wiegand data 1	RCL
R	Red LED	RED
G	Green LED	GRN
A	Yellow LED	YEL
	Shield (do not connect at reader)	0V

Table 5-100: Wiring Cotag Reader 5280 to the RRE

Notes for Dual Zone Controller

At Power Up:

- The Zone 1 Status Led will flash a number of times indicating the first identification number of the data interface programmed into the EPROM.
- Then the Zone 2 Status Led will flash a number of times indicating the second identification number of the data interface programmed into the EPROM.
- When this process is complete, both Status LED’s flash together once and then the green Power-WD LED starts to flicker indicating that the controller has started polling the zones.

After Power Up:

- The Power -WD and RX1 LED will flicker.
- As the Card comes within the range, the zone 1 RX1 LED will glow more brightly.
- As the Card starts being read, the Power-WD LED will stop flickering and glow steadily for half a second.
- If the Card code is valid then the zone 1 Data LED will light.

Notes for Single Zone Controller 3311

The switches on the 3311 must be set as follows:

J1: RLYINT	J2: R=INT	J3: A=INT	J4: G=EXT
J5: G=NRM	J6: D0=T	J7: D1=T	J8: V0=VL
J9: =A	J10: =A		
SW1 = 0	SW2 = 0	SW3 = 0	SW4 = 0
SW5 = 1	SW6 = 2		

Prom must be 2/10.7C IF7.92

"LP1 TX" LED should be flashing brightly

"LP2 RX" LED should light when a card is presented to the reader.

The "LP5 OP" will light when a valid card is read.

HID Reader to RRE-4

Wiring HID MiniProx Model 5365 Reader to the RRE-4

Refer to Table 5-40 through Table 5-44 for RRE-4 terminal identification. Table 5-101 shows the wiring connections to the RRE-4. See Table A-13 for current GE part number information. See UL Specification's Section for additional information.

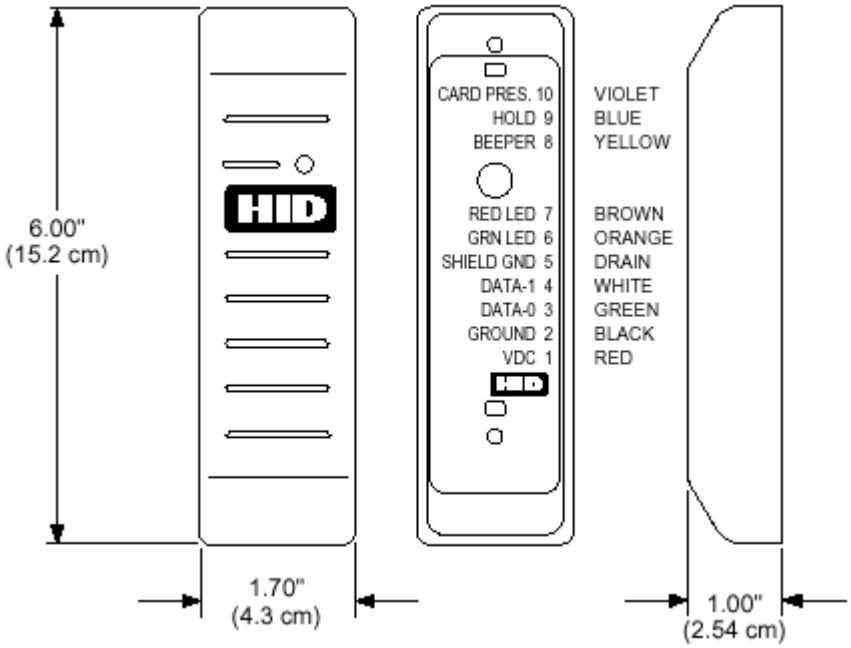


Figure 5-38: HID MiniProx 5365

MiniProx Reader Wire Color	Description	1st Reader	2nd Reader	3rd Reader	4th Reader
Red	+12 Volts	TB2-5 or 6	TB2-5 or 6	TB2-5 or 6	TB2-5 or 6
Black	Ground	TB1-7	TB2-7	TB3-7	TB4-7
Green	Data 0	TB1-8	TB2-8	TB3-8	TB4-8
White	Data 1	TB1-9	TB2-9	TB3-9	TB4-9
Shield	Data Return	N.C.	N.C.	N.C.	N.C.
Orange	Green LED	TB1-11	TB2-11	TB3-11	TB4-11
Brown	Red LED	TB1-10	TB2-10	TB3-10	TB4-10
Yellow	Beeper	TB1-12	TB2-12	TB3-12	TB4-12
Blue	Data Hold	N.C.	N.C.	N.C.	N.C.

Table 5-101: Wiring HID MiniProx Model 5365 Reader to the RRE-4

The reader can be installed up to a maximum cable distance of 500 feet (152 meters) from the RRE-4.

Wiring HID MiniProx Reader Model 5363 and 5364 to RRE-4

Refer to Table 5-40 through Table 5-44 for terminal identification. Table 5-102 shows the wiring connections for the HID MiniProx Model 5363 (12 Volt) to the RRE. Table 5-103 shows the wiring connections for the HID MiniProx Model 5364 (5 Volt) to the RRE-4. See UL Specification's Section for additional information.

MiniProx Reader Wire Color	Description	1st Reader	2nd Reader	3rd Reader	4th Reader
Red	+12 Volts	TB2-5 or 6	TB2-5 or 6	TB2-5 or 6	TB2-5 or 6
Black	Ground	TB1-7	TB2-7	TB3-7	TB4-7
Green	Data 0	TB1-8	TB2-8	TB3-8	TB4-8
White	Data 1	TB1-9	TB2-9	TB3-9	TB4-9
Shield	Data Return	N.C.	N.C.	N.C.	N.C.
Orange	Green LED	TB1-11	TB2-11	TB3-11	TB4-11
Brown	Red LED	TB1-10	TB2-10	TB3-10	TB4-10
Yellow	Beeper	TB1-12	TB2-12	TB3-12	TB4-12
Blue	Data Hold	N.C.	N.C.	N.C.	N.C.

Table 5-102: Wiring HID MiniProx Model 5363 Reader to the RRE-4

MiniProx Reader Wire Color	Description	1st Reader	2nd Reader	3rd Reader	4th Reader
Red	+5 Volts	TB2-3 or 4	TB2-3 or 4	TB2-3 or 4	TB2-3 or 4
Black	Ground	TB1-7	TB2-7	TB3-7	TB4-7
Green	Data 0	TB1-8	TB2-8	TB3-8	TB4-8
White	Data 1	TB1-9	TB2-9	TB3-9	TB4-9
Shield	Data Return	N.C.	N.C.	N.C.	N.C.
Orange	Green LED	TB1-11	TB2-11	TB3-11	TB4-11
Brown	Red LED	TB1-10	TB2-10	TB3-10	TB4-10
Yellow	Beeper	TB1-12	TB2-12	TB3-12	TB4-12
Blue	Data Hold	N.C.	N.C.	N.C.	N.C.

Table 5-103: Wiring HID MiniProx Model 5364 Reader to the RRE-4

NOTE: On the Remote Reader Electronics board set SW1 Switch 5 to ON. See Figure 5-1.

The reader can be installed up to a maximum cable distance of 500 feet (152 meters) from the RRE-4.

Wiring HID ProxPro Model 5355 to Read Head RRE-4

Refer to Table 5-40 through Table 5-44 for RRE terminal identification. Table 5-104 shows the wiring connections to the RRE-4. See Table A-13 for current GE part number information. See UL Specification's Section for additional information.

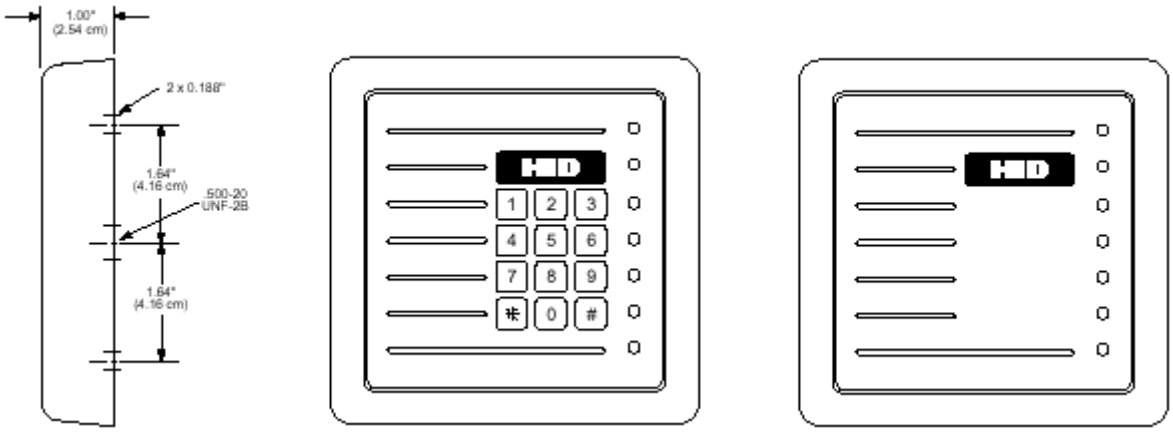


Figure 5-39: HID ProxPro PK-5355 With Keypad and PR-5355 Without Keypad

ProxPro Reader	Description	1st Reader	2nd Reader	3rd Reader	4th Reader
TB1-1	+12 Volts	TB2-5 or 6	TB2-5 or 6	TB2-5 or 6	TB2-5 or 6
TB1-2	Ground	TB1-7	TB2-7	TB3-7	TB4-7
TB1-3	Data 0	TB1-8	TB2-8	TB3-8	TB4-8
TB1-4	Data 1	TB1-9	TB2-9	TB3-9	TB4-9
TB1-5	Data Return	N.C.	N.C.	N.C.	N.C.
TB1-6	Green LED	TB1-11	TB2-11	TB3-11	TB4-11
TB1-7	Red LED	TB1-10	TB2-10	TB3-10	TB4-10
TB1-8	Beeper	TB1-12	TB2-12	TB3-12	TB4-12
TB1-9	Data Hold	N.C.	N.C.	N.C.	N.C.
TB1-10	Tamper	N.C.	N.C.	N.C.	N.C.
TB1-11	Tamper	N.C.	N.C.	N.C.	N.C.

Table 5-104: Wiring HID ProxPro Model 5355 Reader to the RRE-4

The reader can be installed up to a maximum cable distance of 500 feet (152 meters) from the RRE-4.

Switches on HID ProxPro reader:

DIP Switch:

1	On	Identifies unit as Wiegand
2	On	Turns on Beeper
3	Off	Control Green LED by Host
4	On	Keypad Data through Data lines
5	On	2 Wire LED Control
6	On	Common Ground to Data lines
7	On	Common Ground to Data lines
8	On	Common Ground to Data lines

Jumpers:

P1 Jumper 1-2 when mounting on a metallic surface otherwise jumper 2-3.
P3 Jumper 1-2 (Normally Open tamper switch).

LED Operation

Red:	Ready to read card.
OFF:	Prompting User for PIN number.
Green:	Access was granted or door is unlocked.
Red Flashing:	Access was denied or reader is in alarm

NOTE: The keypad will only work if the unit is fully assembled before the unit is powered-up.

Wiring HID ThinLine II Model 5395 Reader to the RRE-4

Refer to Table 5-40 through Table 5-44 for terminal identification. Table 5-105 shows the wiring connections for the HID ThinLine II Model 5395 to the RRE-4. See Table A-13 for current GE part number information. See UL Specification's Section for additional information.

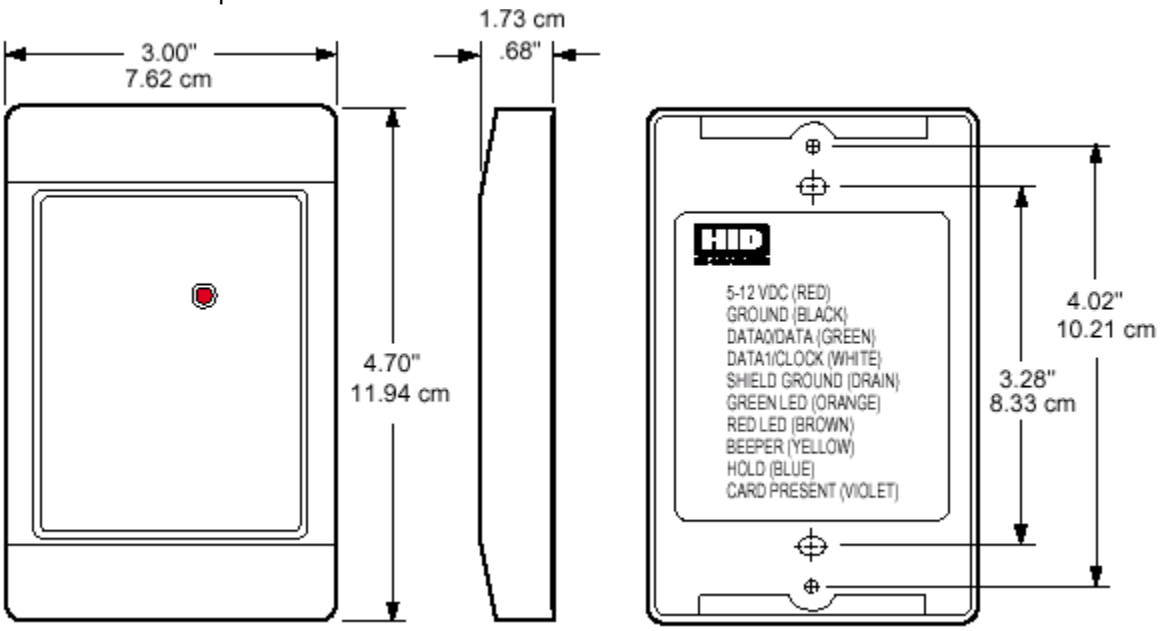


Figure 5-40: ThinLine II Model 5395 Reader to the RRE-4

MiniProx Reader Wire Color	Description	1st Reader	2nd Reader	3rd Reader	4th Reader
Red	+12 Volts	TB2-5 or 6	TB2-5 or 6	TB2-5 or 6	TB2-5 or 6
Black	Ground	TB1-7	TB2-7	TB3-7	TB4-7
Green	Data 0	TB1-8	TB2-8	TB3-8	TB4-8
White	Data 1	TB1-9	TB2-9	TB3-9	TB4-9
Shield	Data Return	N.C.	N.C.	N.C.	N.C.
Orange	Green LED	TB1-11	TB2-11	TB3-11	TB4-11
Brown	Red LED	TB1-10	TB2-10	TB3-10	TB4-10
Yellow	Beeper	TB1-12	TB2-12	TB3-12	TB4-12
Blue	Data Hold	N.C.	N.C.	N.C.	N.C.
Violet	Card Present	N.C.	N.C.	N.C.	N.C.

Table 5-105: Wiring HID ThinLine II Model 5395 Reader to the RRE-4

NOTE: On the Remote Reader Electronics board set SW1 Switch 5 to ON. See Figure 5-1.

Wiring HID ProxPoint Plus 6005 to the RRE-4

Refer to Table 5-40 through Table 5-44 for RRE terminal identification. Table 5-106 shows the wiring connections to the RRE-4. See Table A-13 for current GE part number information. See UL Specification's Section for additional information.

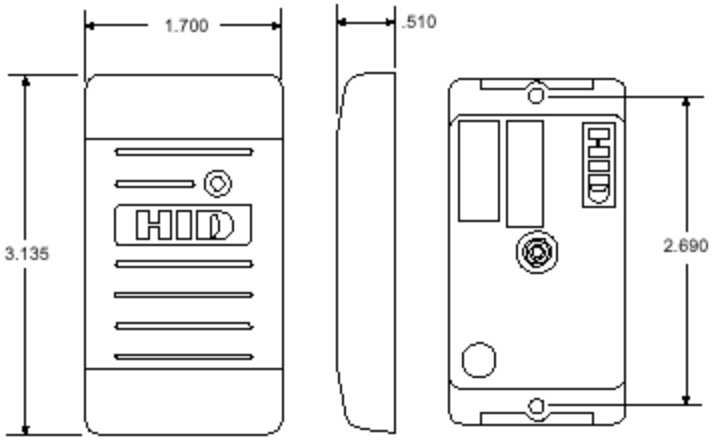


Figure 5-41: HID ProxPoint Plus 6005

MiniProx Reader Wire Color	Description	1st Reader	2nd Reader	3rd Reader	4th Reader
Red	+12 Volts	TB2-5 or 6	TB2-5 or 6	TB2-5 or 6	TB2-5 or 6
Black	Ground	TB1-7	TB2-7	TB3-7	TB4-7
Green	Data 0	TB1-8	TB2-8	TB3-8	TB4-8
White	Data 1	TB1-9	TB2-9	TB3-9	TB4-9
Shield	Data Return	N.C.	N.C.	N.C.	N.C.
Orange	Green LED	TB1-11	TB2-11	TB3-11	TB4-11
Brown	Red LED	TB1-10	TB2-10	TB3-10	TB4-10
Yellow	Beeper	TB1-12	TB2-12	TB3-12	TB4-12
Blue	Data Hold	N.C.	N.C.	N.C.	N.C.

Table 5-106: Wiring HID Reader to the ACU

The reader can be installed up to a maximum cable distance of 500 feet (152 meters) from the RRE-4.

INDALA Proximity Read Head

Refer to Table 5-40 through Table 5-44 for terminal identification. Table 5-107 shows the wiring connections for the Indala ASR-110 and ASR 112 readers to the RRE-4. Table 5-108 shows the wiring connections for the Indala ASR-142 reader to the RRE-4.

Always follow the instructions that come with the Indala reader.

See UL Specification's Section for additional information.

Wiring ASR-110 or ASR-112 to the RRE-4

Indala ASR-110 or ASR 112	Description	1st Reader	2nd Reader	3rd Reader	4th Reader
Red	+12 Volts	TB2-5 or 6	TB2-5 or 6	TB2-5 or 6	TB2-5 or 6
Black	Ground	TB1-7	TB2-7	TB3-7	TB4-7
Green	Data 0	TB1-8	TB2-8	TB3-8	TB4-8
White	Data 1	TB1-9	TB2-9	TB3-9	TB4-9
Orange	Green LED	TB1-11	TB2-11	TB3-11	TB4-11
Brown	Red LED	TB1-10	TB2-10	TB3-10	TB4-10
Blue	Beeper	TB1-12	TB2-12	TB3-12	TB4-12

Table 5-107: Wiring ASR-110 or ASR-112 to the RRE-4

Wiring ASR-142 to the RRE-4

Indala ASR-110 or ASR 112	Description	1st Reader	2nd Reader	3rd Reader	4th Reader
TB2-10	+12 Volts	TB2-5 or 6	TB2-5 or 6	TB2-5 or 6	TB2-5 or 6
TB2-9	Ground	TB1-7	TB2-7	TB3-7	TB4-7
TB2-5	Data 0	TB1-8	TB2-8	TB3-8	TB4-8
TB2-4	Data 1	TB1-9	TB2-9	TB3-9	TB4-9
TB2-7	Green LED	TB1-11	TB2-11	TB3-11	TB4-11
TB2-8	Red LED	TB1-10	TB2-10	TB3-10	TB4-10

Table 5-108: Wiring ASR-142 to the RRE-4

NOTE: On the Remote Reader Electronics board set SW1 Switch 5 to ON. See Figure 5-1.

SECURAKEY Read Head

Refer to Table 5-40 through Table 5-44 for terminal identification. Table 5-109 shows the wiring connections for the SecuraKey reader to the RRE-4. Always follow the instructions that come with the SecuraKey reader.

See UL Specification's Section for additional information.

Wiring SecuraKey Read Head to the RRE-4

SecuraKey Model SK-028C	Description	1st Reader	2nd Reader	3rd Reader	4th Reader
Red	+12 Volts	TB2-5 or 6	TB2-5 or 6	TB2-5 or 6	TB2-5 or 6
Brown	LED	TB1-11	TB2-11	TB3-11	TB4-11
White	Data 1	TB1-9	TB2-9	TB3-9	TB4-9
Green	Data 0	TB1-8	TB2-8	TB3-8	TB4-8
Black	Ground	TB1-7	TB2-7	TB3-7	TB4-7
Blue	Data Hold	No Connection	No Connection	No Connection	No Connection

Table 5-109: Wiring SecuraKey Read Head to the RRE-4

NOTE: On the Remote Reader Electronics board set SW1 Switch 5 to OFF. See Figure 5-1.

DORADO Read Head Wiring To RRE-4

Refer to Table 5-40 through Table 5-44 for terminal identification. Table 5-110 shows the wiring connections for the Dorado reader to the RRE-4.

Always follow the instructions that come with the Dorado reader.

See UL Specification's Section for additional information.

Wiring Dorado Read Head to the RRE-4

Dorado Model 544B or 644B	Description	1st Reader	2nd Reader	3rd Reader	4th Reader
Red	+5 Volts	TB2-3 or 4	TB2-3 or 4	TB2-3 or 4	TB2-3 or 4
Black	Ground	TB1-7	TB2-7	TB3-7	TB4-7
Green	Data 0	TB1-8	TB2-8	TB3-8	TB4-8
White	Data 1	TB1-9	TB2-9	TB3-9	TB4-9
Brown	Green LED	TB1-10	TB2-10	TB3-10	TB4-10
Yellow	Red LED	TB1-12	TB2-12	TB3-12	TB4-12

Table 5-110: Wiring Dorado Read Head to the RRE-4

Option Switch

A	B	C	D
On	On	Off	Off

NOTE: On the Remote Reader Electronics board set SW1 Switch 5 to ON. See Figure 5-1.

Chapter 6

RIM Remote Input Module and RIM SMT

The Remote Input Module (RIM) provides the interface from the ACU controller and additional alarm sensors. The RIM consists of the electronic circuit board, and the screw terminal connector board, connected together by a ribbon cable. The RIM can be installed in its own tampered enclosure.

Each RIM provides 16 supervised inputs, 3 unsupervised inputs and 2 relay outputs (dry contact relays Single Pole Double Throw).

The Remote Input Module connects to the reader port on the ACU. Each ACU reader port can support four readers in addition to remote modules (RIM, RRM, etc.).

With GE Security ONE-32, DIAMOND, SAPPHIRE, SAPPHIRE Pro and DIAMOND II systems, any combination of 4 remote modules are supported per reader port.

Each of the 16 alarm inputs is supervised as 4-states, Alarm, Secure, Open, Shorted.

A pair of 1 K ohm resistors, at the sensor end of each alarm circuit, ensures that the line resistance is typically 1 K ohm when the alarm is in the secure state.

Warning:

Do not use the ACU controller, Remote Reader Electronics (RRE), Remote Input Module (RIM) or Remote Relay Module (RRM) to switch any voltage above 30 volts. Failure to heed this WARNING: can cause death, personal injury or damage to unit(s).

RIM Surface Mount Board

Figure 6-1shows the location of components discussed in this section for Surface Mount RIM (part number RIM16-E1L).

Surface Mount RIM Board Layout

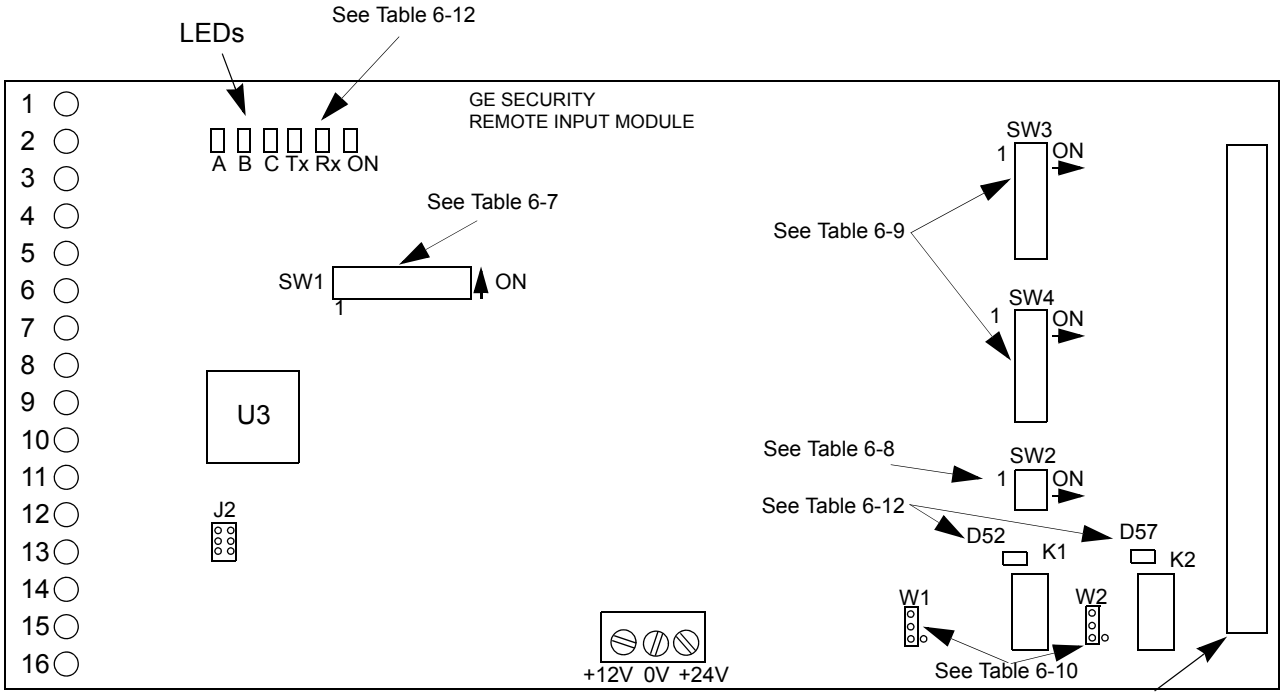


Figure 6-1: SMT RIM Component Location

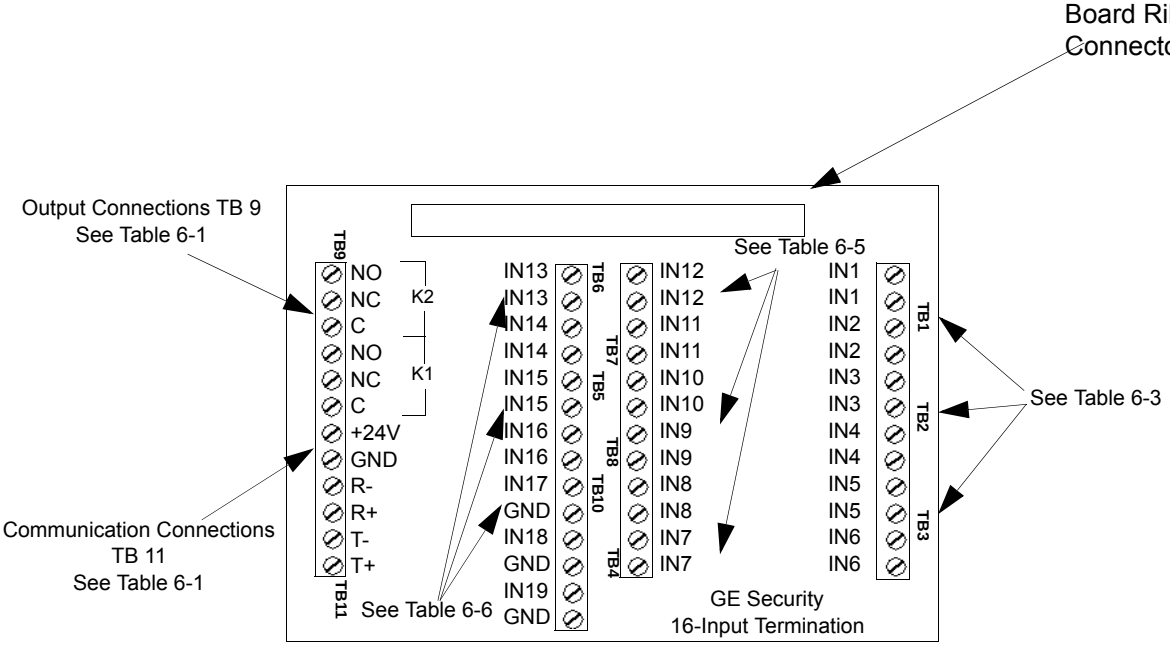


Figure 6-2: PIN Locations on the Terminal Board of the SMT RIM

RIM Board Layout

Figure 6-3shows the location of components discussed in this section.

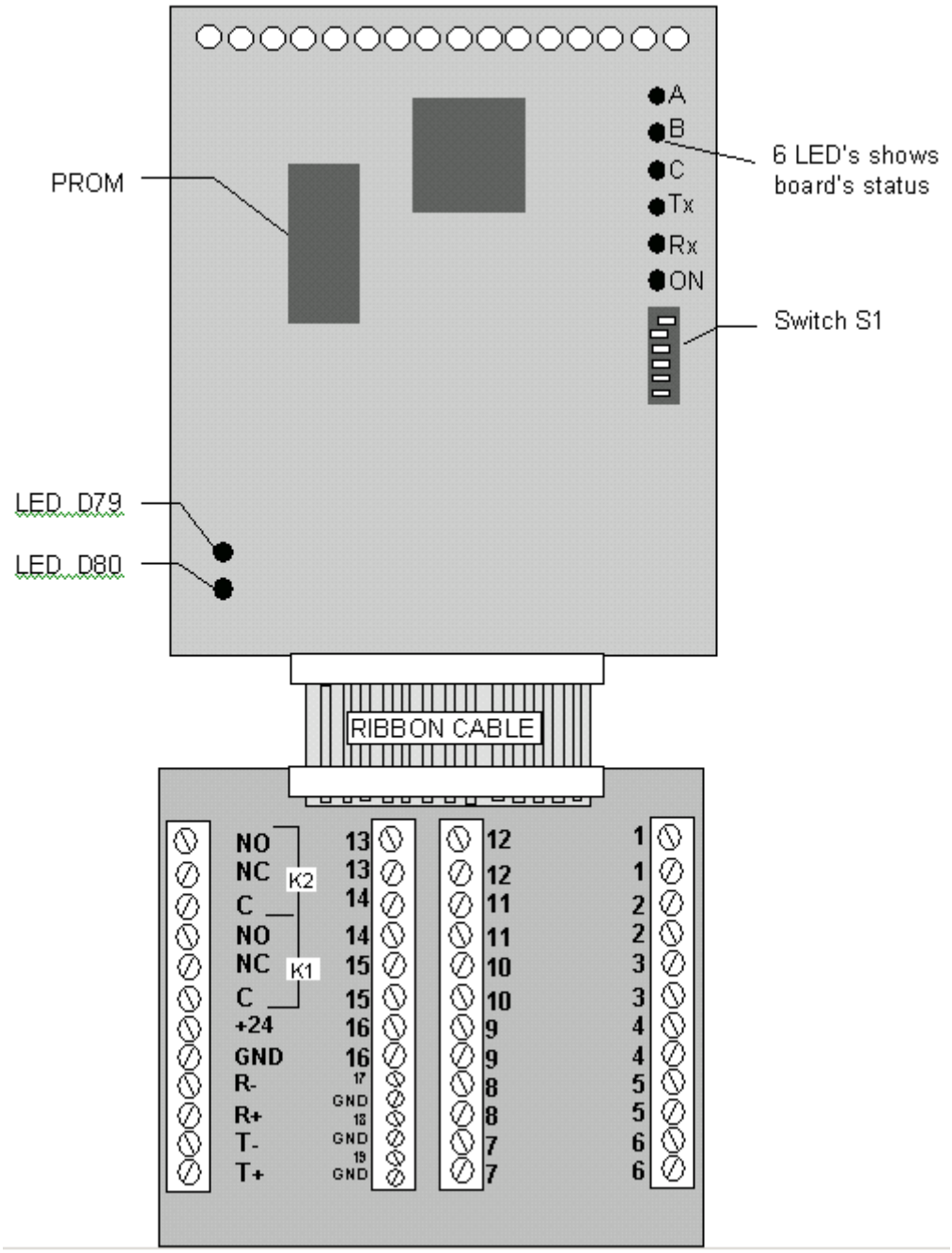


Figure 6-3: Location of Components on the RIM

Terminal Block Connector PIN Numbers on the SMT RIM

Table 6-1 though Table 6-6 show SMT RIM terminal block wiring connections. Refer to Table 3-49 for applicable ACU controller connections and cable identifications.

Connections for SMT RIM (TB9 and TB11) to ACU Reader Port 1

TB	Pin No.	Term. Strip	Description	Connected to: (Filled in by Installer)	Cable Color (Filled in by Installer)
9	1	K2 N.O.	Aux Relay 2 Normally Open		
9	2	K2 N.C.	Aux Relay 2 Normally Closed		
9	3	K2 C.	Aux Relay 2 Common		
9	4	K1 N.O.	Aux Relay 1 Normally Open		
9	5	K1 N.C.	Aux Relay 1 Normally Closed		
9	6	K1 C.	Aux Relay 1 Common		
11	1	+24V	+ 24 Volts In	ACU TB2-7 (+24V)	
11	2	GND	0 V	ACU TB2-8 (0V)	
11	3	R-	To ACU Expansion Port TX (-)	ACU TB2-10 (R1T-)	
11	4	R+	To ACU Expansion Port TX (+)	ACU TB2-9 (R1T+)	
11	5	T-	To ACU Expansion Port RX (-)	ACU TB2-12 (R1R-)	
11	6	T+	To ACU Expansion Port RX(+)	ACU TB2-11 (R1R+)	

Table 6-1: SMT RIM Wiring Connections for SMT RIM TB9 and TB11 to ACU Reader Port 1

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NOTES:

- Each ACU controller has 2 reader ports. Four readers may be multi-dropped on each port along with Remote Relay Modules (SMT RRM) and Remote Input Modules (SMT RIM).
- For cable from the SMT RIM to ACU, the Belden Cable numbers suggested:
  No. 9329-22 AWG for 1000 ft. (305 m) max distance.
- No. 9369-18 AWG for 4000 ft. (1220 m) max distance.
- Install one RS-485 terminator on each reader port.
- Install RS-485 terminator on the farthest reader cable.
- **Readers and Remote Modules should be multi-dropped with no longer than a 10 ft. stub**.

Auxiliary Power Supply for RIM

In most cases the ACU can supply the power for the SMT RIM. When the ACU can not supply power an auxiliary power supply may be used. When using an auxiliary power supply make sure the 0V terminal on all Remote modules are connected back to the auxiliary power supply.

Connections for RIM (TB9 and TB11) to ACU Reader Port 2

TB	Pin No.	Term. Strip	Description	Connected to: (Filled in by Installer)	Cable Color (Filled in by Installer)
9	1	K2 N.O.	Aux Relay 2 Normally Open		
9	2	K2 N.C.	Aux Relay 2 Normally Closed		
9	3	K2 C.	Aux Relay 2 Common		
9	4	K1 N.O.	Aux Relay 1 Normally Open		
9	5	K1 N.C.	Aux Relay 1 Normally Closed		
9	6	K1 C.	Aux Relay 1 Common		
11	1	+24V	+ 24 Volts In	ACU TB2-1 (+24V)	
11	2	GND	0 V	ACU TB2-2 (0V)	
11	3	R-	From ACU TX (-)	ACU TB2-4 (R1T-)	
11	4	R+	From ACU TX (+)	ACU TB2-3 (R1T+)	
11	5	T-	From ACU RX (-)	ACU TB2-6 (R1R-)	
11	6	T+	From ACU RX(+)	ACU TB2-5 (R1R+)	

Table 6-2: RIM Wiring Connections for RIM (TB9 and TB11) to ACU Reader Port 2

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NOTES:

- Each ACU controller has 2 reader ports. Four readers may be multi-dropped on each port along with Remote Relay Modules (RRM) and Remote Input Modules (RIM).
- For cable from the RIM to ACU, the Belden Cable numbers suggested:
  No. 9329-22 AWG for 1000 ft. (305 m) max distance.
- No. 9369-18 AWG for 4000 ft. (1220 m) max distance.
- Two RS-485 Terminators are supplied with each ACU controller.
- Install one RS-485 terminator on each reader port.
- Install RS-485 terminator on the farthest reader cable.
- **Readers and Remote Modules should be multi-dropped with no longer than a 10 ft. stub**.

Connections for TB1 - TB3 on RIM on SMT RIM

TB	Pin No.	Term. Strip	Description	Connected to: (Filled in by Installer)	Cable Color (Filled in by Installer)
1	1	IN1	Zone Input 1		
1	2	IN1	Zone Input 1		
1	3	IN2	Zone Input 2		
1	4	IN2	Zone Input 2		
2	1	IN3	Zone Input 3		
2	2	IN3	Zone Input 3		
2	3	IN4	Zone Input 4		
2	4	IN4	Zone Input 4		
3	1	IN5	Zone Input 5		
3	2	IN5	Zone Input 5		
3	3	IN6	Zone Input 6		
3	4	IN6	Zone Input 6		

Table 6-3: RIM Wiring Connections for TB1 - TB3

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Input State Resistance Range

Zone Input State	Sensor Circuit in Ohms Normally Closed	Sensor Circuit in Ohms Normally Open
Secure	1000	1000
Active	2000	500
Open	> 50,000	> 50,000
Short	< 50	< 50

Table 6-4: Input Zone Status By Resistance

Connections for TB4, TB7 and TB8 on RIM

TB	Pin No.	Term. Strip	Description	Connected to: (Filled in by Installer)	Cable Color (Filled in by Installer)
7	1	IN12	Zone Input 12		
7	2	IN12	Zone Input 12		
7	3	IN11	Zone Input 11		
7	4	IN11	Zone Input 11		
8	1	IN10	Zone Input 10		
8	2	IN10	Zone Input 10		
8	3	IN9	Zone Input 9		
8	4	IN9	Zone Input 9		
4	1	IN8	Zone Input 8		
4	2	IN8	Zone Input 8		
4	3	IN7	Zone Input 7		
4	4	IN7	Zone Input 7		

Table 6-5: RIM Wiring Connections for TB4, 7, and 8

Connections for TB5, TB6, and TB10 on RIM

TB	Pin No.	Term. Strip	Description	Connected to: (Filled in by Installer)	Cable Color (Filled in by Installer)
6	1	IN13	Zone Input 13		
6	2	IN13	Zone Input 13		
6	3	IN14	Zone Input 14		
6	4	IN14	Zone Input 14		
5	1	IN15	Zone Input 15		
5	2	IN15	Zone Input 15		
5	3	IN16	Zone Input 16		
5	4	IN16	Zone Input 16		
10	1	IN17	Unsupervised Zone Input 17		
10	2	GND	Ground		
10	3	IN18	Unsupervised Zone Input 18		
10	4	GND	Ground		
10	5	IN19	Unsupervised Zone Input 19		
10	6	GND	Ground		

Table 6-6: RIM Wiring Connections for TB5, 6, and 10

Setting the DIP Switches on the Surface Mount RIM (only)

SW1 Switch Settings

The 8-position DIP switch (SW1) located on the Surface Mount RIM16-E1L (Figure 6-1) should be set according to Table 6-7.

Switch Number			Description
SW1-1	SW1-2		Module address:
Off	Off		Addr 4
On	Off		Addr 5
Off	On		Addr 6
On	On		Addr 7
SW1-4			Alarm Latching:
On			Enables latching – Associated LEDs for zones 1-16 will latch on alarm. Zone 18 will reset cleared zone LEDs.
Off			Disables latching
SW1-3	SW1-5	SW1-6	Zone Termination:
Off	Off	Off	0.5K alarm, 1K safe, 2K alarm
On	Off	Off	75 ohms alarm, 150 safe, 300 alarm
Off	On	Off	1K safe, 3K alarm, 5-7K ground
On	On	Off	1K safe, 3K alarm
Off	Off	On	6.8K safe, 24K alarm
On	Off	On	1.5K safe, 3K alarm
Off	On	On	10K safe, 5K alarm
On	On	On	5K safe, 10K alarm
			7 & 8 spares

Table 6-7: Surface Mount RIM DIP Switch Settings

SW2 Switch Settings for RS485 Termination

The 2-position DIP switch (SW2) located on the Surface Mount RIM (Figure 6-1) is used to terminate the Surface Mount RIMs RS485 communication.

NOTE: The switches on the surface mount RIM can be changed while power is still applied to the board and take effect immediately.

Switch SW2	Description
SW2-1	Received Pair Termination
SW2-2	Transmit Pair Termination

Table 6-8: Surface Mount RIM Switch SW2 for RS485 Terminations.

SW3 and SW4 Switch Settings for Input Zone Termination

The 8-position DIP switch (SW3 and SW4) located on the Surface Mount RIM (Figure 6-1) are used to terminate the Surface Mount RIMs Inputs.

NOTE: The switches on the surface mount RIM can be changed while power is still applied to the board and take effect immediately.

Switch SW3	Description
SW3-1	Zone 0 Termination*
SW3-2	Zone 1 Termination*
SW3-3	Zone 2 Termination*
SW3-4	Zone 3 Termination*
SW3-5	Zone 4 Termination*
SW3-6	Zone 5 Termination*
SW3-7	Zone 6 Termination*
SW3-8	Zone 7 Termination*
Switch SW4	**Description**
SW4-1	Zone 8 Termination*
SW4-2	Zone 9 Termination*
SW4-3	Zone 10 Termination*
SW4-4	Zone 11 Termination*
SW4-5	Zone 12 Termination*
SW4-6	Zone 13 Termination*
SW4-7	Zone 14 Termination*
SW4-8	Zone 15 Termination*

Table 6-9: Surface Mount RIM Switch SW3 and SW4 for Input Terminations.

* Switch in ON position will terminate the zone with 1K resister.

Setting the Jumper on the Surface Mount RIM (only)

Jumper W1 and W2 Settings

Jumpers W1 and W2 located on the Surface Mount RIM (Figure 6-1) are used to select if 27VDC will be supplied by relays K1 and K2 on the Surface Mount RIMs RS485 communication.

Jumper	Description
W1	Jump pins 2 & 3 Relay K1 Dry
W1	Jump pins 1 & 2 Relay K1 energized with +24V
W2	Jump pins 2 & 3 Relay K2 Dry
W2	Jump pins 1 & 2 Relay K2 energized with +24V

Table 6-10: Surface Mount RIM Jumpers W1 and W2.

Setting the DIP Switches on the RIM

The 6-position DIP switch (S1) located on the RIM (Figure 6-3) should be set according to Table 6-11

NOTE: The switches are read at power-up and will be ignored thereafter. If it is necessary to change a setting, power MUST be cycled OFF then, AFTER the setting are changed, back ON.

Switch Number			Description
SW-1	SW-2		Module address:
Off	Off		Addr 4
On	Off		Addr 5
Off	On		Addr 6
On	On		Addr 7
SW-4			Alarm Latching:
On			Enables latching – Associated LEDs for zones 1-16 will latch on alarm. Zone 18 will reset cleared zone LEDs.
Off			Disables latching
SW-3	SW-5	SW-6	Zone Termination:
Off	Off	Off	1 Kohm = secure / 500 or 2 Kohm = alarm
On	Off	Off	200 ohms = secure / 10K = alarm
Off	On	Off	1 Kohm = secure / 3 Kohm = alarm / 5 or 7 Kohm = tamper
On	On	Off	1 Kohm = secure / 3 Kohm
Off	Off	On	6.8 Kohm = secure / 24.8 Kohm = alarm
On	Off	On	1.5 Kohm = secure / 3 Kohm = alarm
Off	On	On	10 Kohm = secure / 5 Kohm = alarm
On	On	On	5 Kohm = secure / 10 Kohm = alarm

Table 6-11: RIM DIP Switch Settings

Operation LED's on the Surface Mount RIM

The LED's on the Surface Mount Remote Input Module will light as follows:

LED	Description
A	On when board is Communicating to ACU
B	Heart 1 Hz Flash-CPU is functioning correctly
C	Flashing when offline
Tx	Flashing when transmitting data to ACU
Rx	Flashing when receiving data from ACU
ON	ON when Power is applied to board
D57	ON when relay 2 is energized
D52	ON when relay 1 is energized
LED's 1 - 16	Status of 16 Alarm points Green - Secure Red - Active Yellow - Trouble

Table 6-12: RIM and Surface Mount RIM Normal LED Status

Normal Operation LED's on the RIM

The LED's on the Remote Input Module will light as follows:

LED	Description
A	ON steady when board is Online
B	Heart beat 1 flash per second
C	Flashing when board is Off-line
Tx	Flashing when transmitting data to ACU
Rx	Flashing when receiving data from ACU
ON	ON when Power is applied
D79	ON when relay 2 is energized
D80	ON when relay 1 is energized
LED's 1 - 16	Status of 16 Alarm points Green - Secure Red - Active Yellow - Trouble (open or short, etc.)

Table 6-13: RIM Normal LED Status

Alarm Numbers on RIM

RIM Alarm Numbers for the Host PC

Zone Input	Expansion port 1 Address:				Expansion port 2 Address:			
	4	5	6	7	4	5	6	7
IN1	128	144	160	176	192	208	224	240
IN2	129	145	161	177	193	209	225	241
IN3	130	146	162	178	194	210	226	242
IN4	131	147	163	179	195	211	227	243
IN5	132	148	164	180	196	212	228	244
IN6	133	149	165	181	197	213	229	245
IN7	134	150	166	182	198	214	230	246
IN8	135	151	167	183	199	215	231	247
IN9	136	152	168	184	200	216	232	248
IN10	137	153	169	185	201	217	233	249
IN11	138	154	170	186	202	218	234	250
IN12	139	155	171	187	203	219	235	251
IN13	140	156	172	188	204	220	236	252
IN14	141	157	173	189	205	221	237	253
IN15	142	158	174	190	206	222	238	254
IN16	143	159	175	191	207	223	239	255
IN17	96	100	104	108	112	116	120	124
IN18	97	101	105	109	113	117	121	125
IN19	98	102	106	110	114	118	122	126
Offline	99	103	107	111	115	119	123	127

Table 6-14: RIM Alarm Numbers for the Host PC

Relay Numbers on RIM

RIM Relay Numbers for the Host PC

Relay Number	Expansion port 1 Address:				Expansion port 2 Address:			
	4	5	6	7	4	5	6	7
K1	32	34	36	38	40	42	44	46
K2	33	35	37	39	41	43	45	47

Table 6-15: RIM Relay Numbers for the Host PC

Chapter 7

RRM Remote Relay Module and RRM SMT

The Surface Mount Remote Relay Module (part numbers RRM16-E00 and RRM16-E1L) provides eight Single Pole Double Throw (SPDT) and eight Double Pole Double Throw (DPDT) dry contact relays.

Each relay is rated 2 Amps at 24 VDC.

Three LED's provide heartbeat feedback and online status. Twenty two hardware controlled LED's provide communication, power and relay status.

Two unsupervised inputs are available for power fault and cabinet tamper.

The Remote Relay Module requires 24 VDC (±15%).

Warning:

Do not use the ACU controller, Remote Reader Electronics (RRE), Remote Input Module (RIM) or Remote Relay Module (RRM) to switch any voltage above 30 volts. Failure to heed this WARNING: can cause death, personal injury or damage to unit(s).

Auxiliary Power Supply for RRM

In most cases the ACU can supply the power for the RRM. When the ACU can not supply power an auxiliary power supply may be used. When using an auxiliary power supply make sure the 0V terminal on all Remote modules are connected back to the auxiliary power supply.

RRM Surface Mount Circuit Board

Figure 7-1 shows the location of components discussed in this section for the Surface Mount RRM.

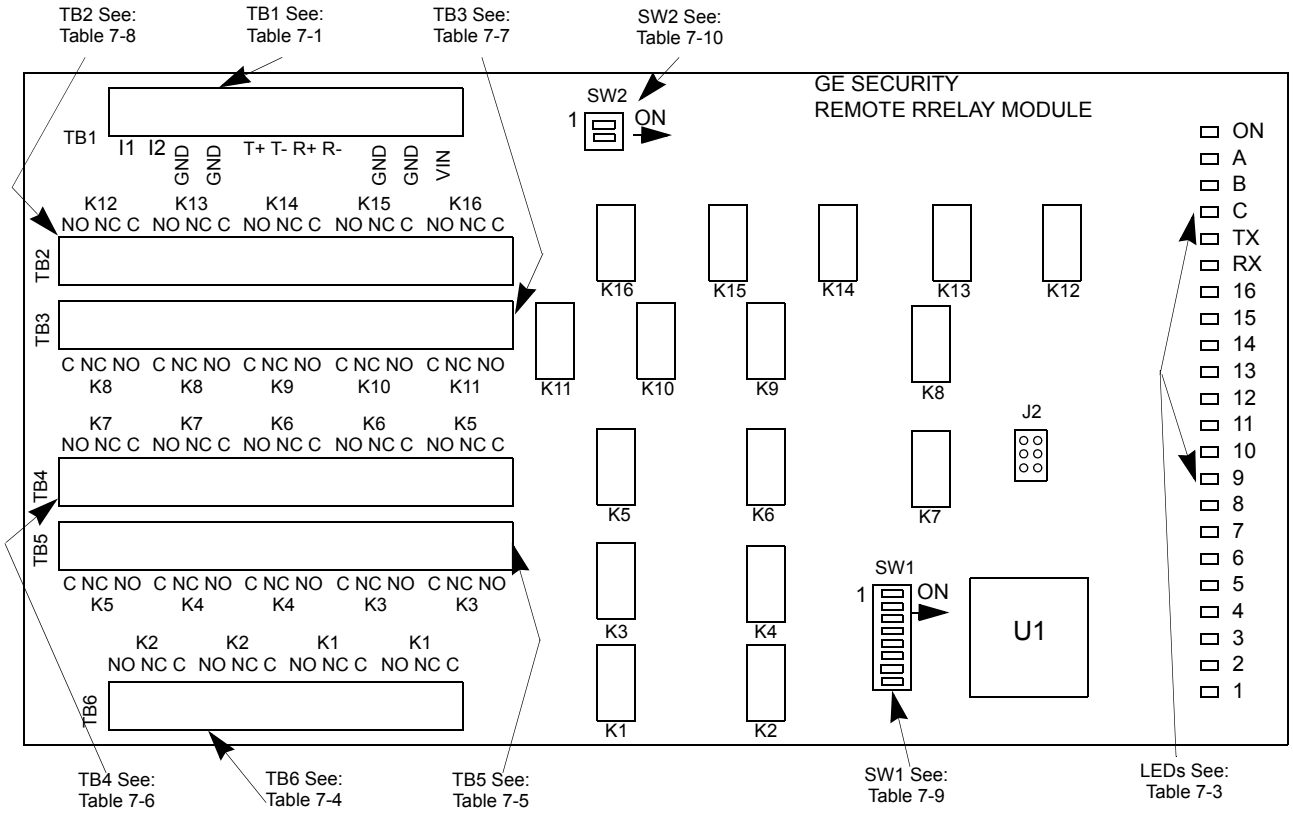
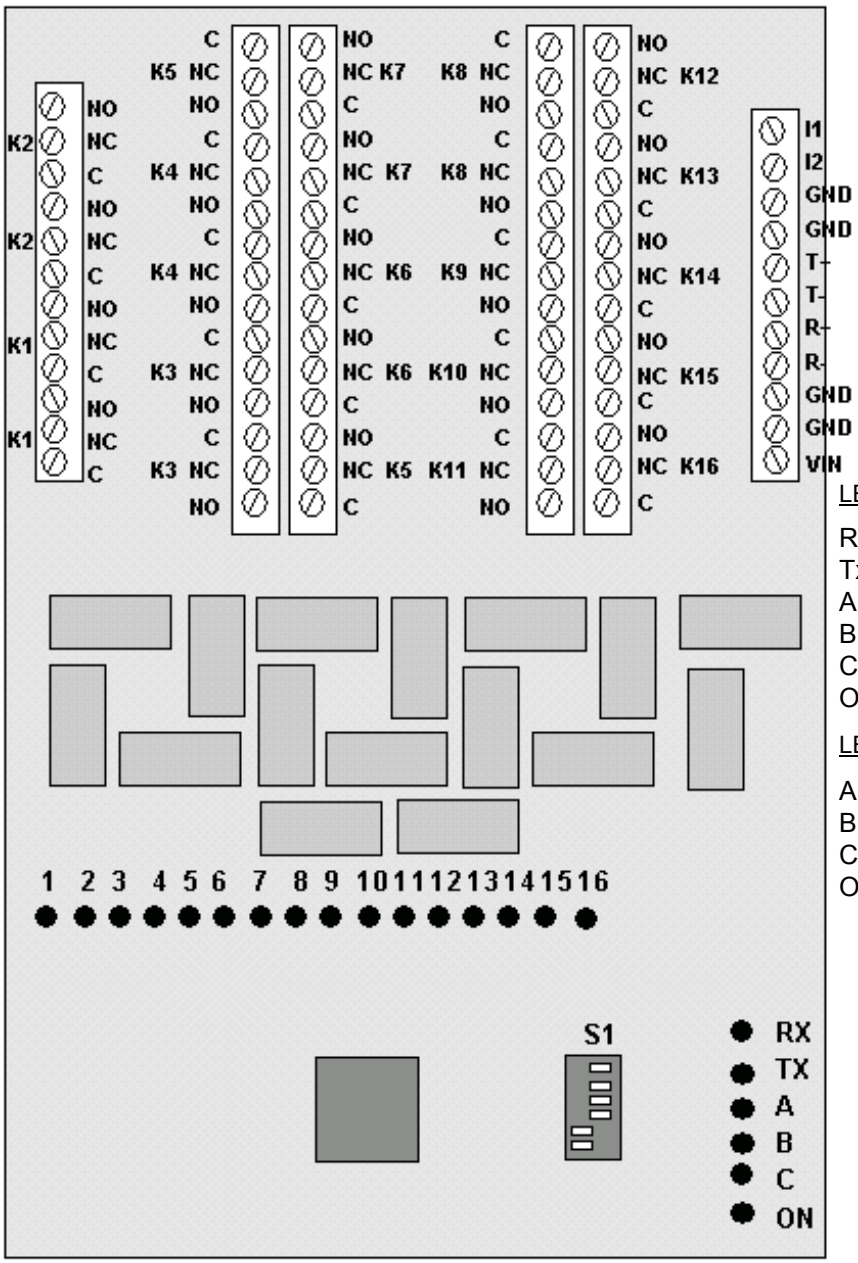


Figure 7-1: Locations of Components on Surface Mount RRM

RRM Circuit Board

Figure 7-2 shows the location of components discussed in this section.



LED Communication Status

Rx - Flashing when receiving data
Tx - Flashing when transmitting data
A - On steady when board is Online
B - Heart beat 1 flash per second
C - Flashing when board is Off-line
ON - Power is applied to the board

LED Power Up Diagnostics

A - ON at start of self test
B - ON if RAM is OK
C - ON if PROM is OK
ON - ON if power is applied

Figure 7-2: Locations of Components on the RRM

Terminal Block Connector PIN Numbers on the RRM

Table 7-1 though Table 7-7 shows RRM terminal block wiring connections. Refer to Table 3-49 for applicable ACU controller connections and cable identifications.

Connections for Reader Port 1 on RRM

TB Number	Pin No.	Description	Connected to: (Filled in by Installer)	Connected to: (Filled in by Installer)
TB1	I1	Unsupervised Alarm 1		
TB1	I2	Unsupervised Alarm 2		
TB1	GND	Alarm common ground		
TB1	GND	Alarm common ground		
TB1	T+	To ACU RX (+)	ACU TB2-11 (R1R+)	
TB1	T-	To ACU RX (-)	ACU TB2-12 (R1R-)	
TB1	R+	From ACU TX (+)	ACU TB2-9 (R1T+)	
TB1	R-	From ACU TX (-)	ACU TB2-10 (R1T-)	
TB1	GND	Ground		
TB1	GND	Ground	ACU TB2-8 (0V)	
TB1	VIN	+ 24 Volts In	ACU TB2-7 (+24V)	

Table 7-1: RRM Wiring Connections for Reader Port 1

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NOTES:

1. Each ACU2 controller has 2 reader ports. Four readers may be multi-dropped on each port along with Remote Relay Modules (RRM) and Remote Input Modules (RIM).
2. Belden Cable numbers suggested:
3. No. 9329-22 AWG for 1000 ft. (305 m) max distance.
4. No. 9369-18 AWG for 4000 ft. (1220 m) max distance.
5. RS-485 Terminators are supplied with each ACU controller.
6. Install one RS-484 terminator on each reader port.
7. Install RS-485 terminator on the farthest ACU reader cable.
8. **Readers and Remote Modules should be multi-dropped with no longer than a 10 ft. stub**.

Connections for Reader Port 2 on RRM

Pin No.	Description	Connected to: (Filled in by Installer)	Connected to: (Filled in by Installer)
I1	Unsupervised Alarm 1		
I2	Unsupervised Alarm 2		
GND	Alarm common ground		
GND	Alarm common ground		
T+	To ACU RX (+)	ACU TB2-5 (R2R+)	
T-	To ACU RX (-)	ACU TB2-6 (R2R-)	
R+	From ACU TX (+)	ACU TB2-3 (R2T+)	
R-	From ACU TX (-)	ACU TB2-4 (R2T-)	
GND	Ground		
GND	Ground	ACU TB2-2 (0V)	
VIN	+ 24 Volts In	ACU TB2-1 (+24V)	

Table 7-2: RRM Wiring Connections for Reader Port 2

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NOTES:

- Each ACU2 controller has 2 reader ports. Four readers may be multi-dropped on each port along with Remote Relay Modules (RRM) and Remote Input Modules (RIM).
- Belden Cable numbers suggested:
- No. 9329-22 AWG for 1000 ft. (305 m) max distance.
- No. 9369-18 AWG for 4000 ft. (1220 m) max distance.
- RS-485 Terminators are supplied with each ACU controller.
- Install one RS-485 terminator on each reader port.
- Install RS-485 terminator on the farthest reader cable.
- **Readers and Remote Modules should be multi-dropped with no longer than a 10 ft. stub**.

Normal Operation LED's on the RRM

LED	Description
A	ON steady when board is Online
B	Heart beat 1 flash per second
C	Flashing when Offline
Tx	Flashing when transmitting data to ACU
Rx	Flashing when receiving data from ACU
ON	ON when Power is applied
LED's 1 - 16	One LED per Relay LED is ON when relay is energized

Table 7-3: RRM Normal LED Operation

Connections for Relays K1 & K2 on RRM

TB Number	Pin No.	Description	Connected to: (Filled in by Installer)	Connected to: (Filled in by Installer)
TB6	K2 NO	Relay 2 Normally Open		
TB6	K2 NC	Relay 2 Normally Closed		
TB6	K2 C	Relay 2 Common		
TB6	K2 NO	Relay 2 Normally Open		
TB6	K2 NC	Relay 2 Normally Closed		
TB6	K2 C	Relay 2 Common		
TB6	K1 NO	Relay 1 Normally Open		
TB6	K1 NC	Relay 1 Normally Closed		
TB6	K1 C	Relay 1 Common		
TB6	K1 NO	Relay 1 Normally Open		
TB6	K1 NC	Relay 1 Normally Closed		
TB6	K1 C	Relay 1 Common		

Table 7-4: RRM Wiring Connections for Relays 1 & 2

Connections for Relays K3 – K5 on RRM

TB5	K5 C	Relay 5 Common		
TB5	K5 NC	Relay 5 Normally Closed		
TB5	K5 NO	Relay 5 Normally Open		
TB5	K4 C	Relay 4 Common		
TB5	K4 NC	Relay 4 Normally Closed		
TB5	K4 NO	Relay 4 Normally Open		
TB5	K4 C	Relay 4 Common		
TB5	K4 NC	Relay 4 Normally Closed		
TB5	K4 NO	Relay 4 Normally Open		
TB5	K3 C	Relay 3 Common		
TB5	K3 NC	Relay 3 Normally Closed		
TB5	K3 NO	Relay 3 Normally Open		
TB5	K3 C	Relay 3 Common		
TB5	K3 NC	Relay 3 Normally Closed		
TB5	K3 NO	Relay 3 Normally Open		

Table 7-5: RRM Wiring Connections for Relays 3 - 5

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Connections for Relays K5 - K7 on RRM

TB Number	Pin No.	Description	Connected to: (Filled in by Installer)	Connected to: (Filled in by Installer)
TB4	K7 NO	Relay 7 Normally Open		
TB4	K7 NC	Relay 7 Normally Closed		
TB4	K7 C	Relay 7 Common		
TB4	K7 NO	Relay 7 Normally Open		
TB4	K7 NC	Relay 7 Normally Closed		
TB4	K7 C	Relay 7 Common		
TB4	K6 NO	Relay 6 Normally Open		
TB4	K6 NC	Relay 6 Normally Closed		
TB4	K6 C	Relay 6 Common		
TB4	K6 NO	Relay 6 Normally Open		
TB4	K6 NC	Relay 6 Normally Closed		
TB4	K6 C	Relay 6 Common		
TB4	K5 NO	Relay 5 Normally Open		
TB4	K5 NC	Relay 5 Normally Closed		
TB4	K5 C	Relay 5 Common		

Table 7-6: RRM Wiring Connections for Relays 5-7

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Connections for Relays K8 - K11 on RRM

TB Number	Pin No.	Description	Connected to: (Filled in by Installer)	Connected to: (Filled in by Installer)
TB3	K8 C	Relay 8 Common		
TB3	K8 NC	Relay 8 Normally Closed		
TB3	K8 NO	Relay 8 Normally Open		
TB3	K8 C	Relay 8 Common		
TB3	K8 NC	Relay 8 Normally Closed		
TB3	K8 NO	Relay 8 Normally Open		
TB3	K9 C	Relay 9 Common		
TB3	K9 NC	Relay 9 Normally Closed		
TB3	K9 NO	Relay 9 Normally Open		
TB3	K10 C	Relay 10 Common		
TB3	K10 NC	Relay 10 Normally Closed		
TB3	K10 NO	Relay 10 Normally Open		
TB3	K11 C	Relay 11 Common		
TB3	K11 NC	Relay 11 Normally Closed		
TB3	K11 NO	Relay 11 Normally Open		

Table 7-7: RRM Wiring Connections for Relays 8-11

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Connections for Relays K12 - K16 on RRM

TB Number	Pin No.	Description	Connected to: (Filled in by Installer)	Connected to: (Filled in by Installer)
TB2	K12 NO	Relay 12 Normally Open		
TB2	K12 NC	Relay 12 Normally Closed		
TB2	K12 C	Relay 12 Common		
TB2	K13 NO	Relay 13 Normally Open		
TB2	K13 NC	Relay 13 Normally Closed		
TB2	K13 C	Relay 13 Common		
TB2	K14 NO	Relay 14 Normally Open		
TB2	K14 NC	Relay 14 Normally Closed		
TB2	K14 C	Relay 14 Common		
TB2	K15 NO	Relay 15 Normally Open		
TB2	K15 NC	Relay 15 Normally Closed		
TB2	K15 C	Relay 15 Common		
TB2	K16 NO	Relay 16 Normally Open		
TB2	K16 NC	Relay 16 Normally Closed		
TB2	K16 C	Relay 16 Common		

Table 7-8: RRM Wiring Connections for Relays 12-16

Setting the DIP Switches on the RRM and Surface Mount RRM

SW1 Settings on Surface Mount RRM

The 6-position DIP switch (S1) located on the RRM (Figure 7-2) should be set according to Table 7-9.

The 8-position DIP switch (SW1) located on the Surface Mount RRM (Figure 7-1) should be set according to Table 7-9.

NOTE: The switches are read at power-up and will be ignored thereafter. If it is necessary to change a setting, power MUST be cycled OFF then, AFTER the setting are changed, back ON.

Switches 1,2 - Communication Address:	1 = OFF 2 = OFF Address 4 1 = ON 2 = OFF Address 5 1 = OFF 2 = ON Address 6 1 = ON 2 = ON Address 7
Switch 3	Spare
Switch 4	Spare
Switch 5	Spare
Switch 6	Spare
Switch 7 (Surface Mount Only)	Spare
Switch 8 (Surface Mount Only)	Spare

Table 7-9: RRM DIP Switch SW1 Settings

SW2 Settings on Surface Mount RRM

The 2-position DIP switch (SW2) located on the Surface Mount RRM (Figure 7-1) is used to terminate the RS-485 communications and should be set according to Table 7-10.

NOTE: The switches on the surface mount RRM can be changed while power is still applied to the board and take effect immediately.

Switch Number	Function
SW2-1	Receive Pair Termination
SW2-2	Transmit Pair Termination

Table 7-10: RRM DIP Switch SW1 Settings

Alarm Numbers on RRM and Surface Mount RRM

RRM Alarm Numbers for the Host PC

Zone Number	Expansion port 1 Address:				Expansion port 2 Address:			
	4	5	6	7	4	5	6	7
IN1	97	101	105	109	113	117	121	125
IN2	98	102	106	110	114	118	122	126
Offline	99	103	107	111	115	119	123	127

Table 7-11: RRM Alarm Numbers for the Host PC

Relay Numbers on RRM and Surface Mount RRM

RRM Relay Numbers for the Host PC

Relay Number	Expansion port 1 Address:				Expansion port 2 Address:			
	4	5	6	7	4	5	6	7
K1	112	128	144	160	48	64	80	96
K2	113	129	145	161	49	65	81	97
K3	114	130	146	162	50	66	82	98
K4	115	131	147	163	51	67	83	99
K5	116	132	148	164	52	68	84	100
K6	117	133	149	165	53	69	85	101
K7	118	134	150	166	54	70	86	102
K8	119	135	151	167	55	71	87	103
K9	120	136	152	168	56	72	88	104
K10	121	137	153	169	57	73	89	105
K11	122	138	154	170	58	74	90	106
K12	123	139	155	171	59	75	91	107
K13	124	140	156	172	60	76	92	108
K14	125	141	157	173	61	77	93	109
K15	126	142	158	174	62	78	94	110
K16	127	143	159	175	63	79	95	111

Table 7-12: RRM Relay Numbers for the Host PC

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Chapter 8

Testing Procedures

Once the ACU controller, One-Stage Reader, RRE, RIM or RRM has been installed and the wiring and DIP switch settings have been verified, the system should be tested according to the following procedures.

Power-Up Self-Test On The ACU2X Controller

LED	Description
LED1 (Red)	ON indicating power-up
LED2 (Red)	ON when successful RAM test finished (blinks once if 1-Mbyte RAM installed)
LED3 (Red)	ON when successful PROM test finished
LED4 (Red)	ON for one second when initialization completes

Table 8-1: ACU2X LED Power-Up Self Test

Power-Up Self-Test On The ACU2 Controller

The ACU2 controller should always be tested after installing any module. The power-up self-test indicators for the ACU2 controller are LED1, LED2, LED3, and LED4 on the ACU2 controller's PCB Assembly (See Figure 3-19). The LED's will light at power-up as follows, after all ON at hardware reset, then all OFF:

LED	Description
LED1 (Green)	ON indicating power-up
LED2 (Yellow)	ON when successful RAM test finished (blinks once if 1-Mbyte RAM installed)
LED3 (Green)	ON when successful PROM test finished
LED4 (Yellow)	ON for one second when initialization completes

Table 8-2: ACU2 LED Power-Up Self Test

Online Tests For ACUX Controllers

LED	Description
LED1 (Red)	Flashes at a 1 Hz rate
LED2 (Red)	ON while transmitting to the Remote Module
LED3 (Red)	Two seconds OFF, then blinks once if Reader 0 is online, followed by blinking twice if Reader 1 is online, etc.
LED4 (Red)	ON if zone voltage reference is ever out of range (indicates board or power supply failure)
H1 (Green)	ON when transmitting data to host
H1 (Yellow)	ON when receiving data from host
H2 (Green)	ON when transmitting data to host
H2 (Yellow)	ON when receiving data from host

Table 8-3: ACU2X Online Test LEDS

Online Tests For ACU Controllers

The normal operating indicators for the ACU controller are indicated by LED's 1 - 6 (See Figure 3-19). The LED's on the ACU controller's PCB will light as follows:

LED	Description
LED1 (Green)	Flashes at a 1 Hz rate
LED2 (Yellow)	ON while transmitting to the Remote Modules
LED3 (Green)	Two seconds OFF, then blinks once if Reader 0 is online, followed by blinking twice if Reader 1 is online, etc.
LED4 (Yellow)	ON if zone voltage reference is ever out of range (indicates board or power supply failure)
LED5 (Green)	ON when transmitting data to host
LED6 (Yellow)	ON when receiving data from host

Table 8-4: ACU Online Test LEDS

If LEDs 1,2,3 and 4 flash simultaneously once a second usually indicates that the memory module, SIMM, is not being recognized or the EPROM has a problem.

One-Stage Reader Field Wiring Test

After making all connections and prior to connecting TB1 to the RMS/RWE reader, the following tests should be made. Connections should already be completed at the ACU and external power supply if used.

Layout of the connector block as viewed from the rear of the reader

TB1 Terminal numbers with function description.

PIN #	Description
1	+ 24 VDC
2	0 VDC
3	Not Used - Make No Connection
4	Transmit Data +
5	Transmit Data -
6	Receive Data +
7	Receive Data -
8	Zone Input 0+ Norm. Door Contact
9	Zone Input 0- Norm. Door Contact
10	Zone Input 1+ Norm. Exit Push Button
11	Zone Input 1- Norm. Exit Push Button
12	Zone Input 2+ Aux. Input #1
13	Zone Input 2- Aux. Input #1
14	Zone Input 3+ Aux. Input #2
15	Zone Input 3- Aux. Input #2
16	Door Strike

Table 8-5: One-Stage Reader Wiring Test

From	To	Voltage	Tolerance
Term 1	Term 2	+ 24 VDC	3.5 VDC
Term 4	Term 5	+ 4.0 VDC*	0.5 VDC
Term 6	Term 7	+ 2.5 VDC *	0.5 VDC
Term 1	Bldg. Gnd.	24 VDC	3.5 VDC
Term 2	Bldg. Gnd.	0 VDC	0.5 VDC
Term 4	Bldg. Gnd.	Less than 6.0 VDC	N/A
Term 5	Bldg. Gnd.	Less than 6.0 VDC	N/A
Term 6	Bldg. Gnd.	Less than 6.0 VDC	N/A
Term 7	Bldg. Gnd.	Less than 6.0 VDC	N/A

Table 8-6: Test Points and Voltages

* After the first reader is connected these voltages will modulate due to data on the line.

Most Digital Volt Meters should indicate about 2.0 VDC.

From	To	Resistance
Term 8	Term 9	1 K ohm with door closed 2 K or 500 ohm door open
Term 10	Term 11	2 K or 500 ohm with EPB idle 1 K ohm with EPB active
Term 12 Term 14	Term 13 Term 15	1 K ohm secure 2 K or 500 ohms in alarm

Table 8-7: Test Points and Resistance

Power-Up Self-Test on the One-Stage Reader

The One-Stage Reader should always be tested after installation. The indicators for the One-Stage Reader are the three LED's located on the faceplate of the Reader (Figure 4-1). The LED's will light as follows:

Green LED	ON at power-up
Yellow LED	ON when successful RAM test is finished
Red LED	ON when successful PROM test and initialization completed

Table 8-8: One Stage Reader Power-Up Self Test

After all three LED's have lit, RED LED and GREEN LED will be OFF and YELLOW LED will flash at a 1 Hz rate.

Normal Operation Test on the One-Stage Reader

The One-Stage Reader should always be tested after installation. The indicators for the reader are the three LED's located on the faceplate of the reader (Figure 4-1). The operations and status indications are shown in Table 8-9.

State	Red	Yellow	Green	Beeper
Online	On	Dim Flash	Off	None
Off-Line	Off	Dim Flash	Dim Flash	None
Access Grant	Off	Dim Flash	Flashes	One 2-Second Beep
Door Unlocked	Off	Dim Flash	On	None
Access Denied	Off	Dim Flash	Off	Three 1/2-Second Beeps
Not Configured	Off	Dim Flash	Off	None
Door In Alarm	Bright Flash	Bright Flash	Bright Flash	Interrupted Beep
Door In Alarm (Masked)	Bright Flash	Bright Flash	Bright Flash	None
Enter Keypad	Off	Bright Flash	Off	None
Key Pressed	Flash	Bright Flash	Flash	When Keypad Pressed
Second Card	Bright Flash	Dim Flash	Off	None
Area Secured	On	Dim Flash	Off	One-4-Second Beep
Area Unsecured	Off	Dim Flash	On	Two 2-Second Beeps

Table 8-9: One-Stage Reader LED/Beeper Usage

RRE Field Wiring Test

After making all connections and prior to connecting TB1 to the RRE reader, the following tests should be made. Connections should already be completed at the ACU and external power supply if used.

Layout of the connector block as viewed from the front of RRE

TB1 Terminal Numbers With Function Description

PIN #	Description
1	+ 24 VDC
2	0 VDC
3	+12 VDC
4	Transmit Data +
5	Transmit Data -
6	Receive Data +
7	Receive Data -
8	Zone Input 0+ Norm. Door Contact
9	Zone Input 0- Norm. Door Contact
10	Zone Input 1+ Norm. Exit Push Button
11	Zone Input 1- Norm. Exit Push Button
12	Zone Input 2+ Aux. Input #1
13	Zone Input 2- Aux. Input #1
14	Zone Input 3+ Aux. Input #2
15	Zone Input 3- Aux. Input #2

Table 8-10: REE Connections

Test Points and Expected Voltages

From	To	Voltage	Tolerance
Term 1	Term 2	+ 24 VDC	3.5 VDC
Term 4	Term 5	+ 4.0 VDC*	0.5 VDC
Term 6	Term 7	+ 2.5 VDC *	0.5 VDC
Term 1	Bldg. Gnd.	24 VDC	3.5 VDC
Term 2	Bldg. Gnd.	0 VDC	0.5 VDC
Term 4	Bldg. Gnd.	Less than 6.0 VDC	N/A
Term 5	Bldg. Gnd.	Less than 6.0 VDC	N/A
Term 6	Bldg. Gnd.	Less than 6.0 VDC	N/A
Term 7	Bldg. Gnd.	Less than 6.0 VDC	N/A

Table 8-11: RRE Test Points and Voltages

* After the first reader is connected these voltages will modulate due to data on the line.

Most Digital Volt Meters should indicate about 2.0 VDC.

Test points and expected resistance

From	To	Resistance
Term 8	Term 9	1 K ohm with door closed 2 K or 500 ohm door open
Term 10	Term 11	2 K or 500 ohm with EPB idle 1 K ohm with EPB active
Term 12 Term 14	Term 13 Term 15	1 K ohm secure 2 K or 500 ohms in alarm

Table 8-12: RRE Test Points and Resistance

Power-Up Self-Test on the RRE

The RRE should always be tested after installation. The LED on the read head installed can be used as the indicator for the test (Table 8-8). If installation does not have a read head with an LED, perform routine function tests of the system.

Normal Operation Test on the RRE

The RRE should always be tested after installation. The operations and status indications are shown in Table 8-13. See Figure 5-2 for the locations on LED's.

LED	Description
Tx	Flashing when transmitting data to ACU
Rx	Flashing when receiving data from ACU
ON	ON when power is supplied
Led 4	ON when relay 1 is energized
Led 5	ON when relay 2 is energized

Table 8-13: LED Indicators on the RRE

The LED on the read head installed can be used as the indicator for the test. The operation and status indications are shown in Table 8-14.

State	LED
Online	Off
Off-Line	Dim Flash
Access Grant	Flashes
Door Unlocked	On
Door In Alarm	Bright Flashing
Note: The IGS Mullion Reader has 3 LED's; refer to Table 8-2	

Table 8-14: Read Head LED Usage for RRE

RIM Field Wiring Test

After making all connections and prior to connecting the ribbon cable to the RIM, the following tests should be made. Connections should already be completed at the ACU and external power supply if used.

Test points and expected voltages.

From	To	Voltage	Tolerance
GND	+24V	+ 24 VDC	3.5 VDC
T+	T-	+ 4.0 VDC*	0.5 VDC
R+	R-	+ 2.5 VDC *	0.5 VDC
+24V	Bldg. Gnd.	24 VDC	3.5 VDC
GND	Bldg. Gnd.	0 VDC	0.5 VDC
T+	Bldg. Gnd.	Less than 6.0 VDC	N/A
T-	Bldg. Gnd.	Less than 6.0 VDC	N/A
R+	Bldg. Gnd.	Less than 6.0 VDC	N/A
R-	Bldg. Gnd.	Less than 6.0 VDC	N/A

Table 8-15: RIM Test Points and Voltages

* After the first reader is connected these voltages will modulate due to data on the line.

Most Digital Volt Meters should indicate about 2.0 VDC.

Power-Up Self Test on the RIM

The Remote Input Module should always be tested after installation. The indicators for the RIM are the red LED's located on the component board. See Figure 6-3 for the locations of LED's. The LED's will light as shown in Table 8-16 and Table 8-17.

LED	Description
A	ON at power-up
B	ON when successful RAM test is finished
C	ON when successful PROM test and initialization completed
ON	ON when Power is applied
LED's 1 - 16	All Green, then All Yellow, then All Red

Table 8-16: Power-up LED Indicators on the RIM

Normal Operation Test on the RIM

The operation and status LED's will light as follows:

LED	Description
A	ON steady when board is Online with the ACU controller
B	Heart beat 1 flash per second
C	Flashing when board is Off-Line with the ACU
TX	Flashing when transmitting data to ACU
RX	Flashing when receiving data from ACU
ON	ON when Power is applied
D79	ON when relay 2 is energized
D80	ON when relay 1 is energized
LED's 1 - 16	Status of 16 Alarm points Green - Secure Red - Active (in Alarm) Yellow - Trouble (open or short etc.)

Table 8-17: Normal LED Indicators on the RIM

RRM Field Wiring Test

After making all connections and prior to connecting the ribbon cable to the RRM, the following tests should be made. Connections should already be completed at the ACU and external power supply if used.

Test points and expected voltages

From	To	Voltage	Tolerance
GND	VIN	+ 24 VDC	3.5 VDC
T+	T-	+ 4.0 VDC*	0.5 VDC
R+	R-	+ 2.5 VDC *	0.5 VDC
+24V	Bldg. Gnd.	24 VDC	3.5 VDC
GND	Bldg. Gnd.	0 VDC	0.5 VDC
T+	Bldg. Gnd.	Less than 6.0 VDC	N/A
T-	Bldg. Gnd.	Less than 6.0 VDC	N/A
R+	Bldg. Gnd.	Less than 6.0 VDC	N/A
R-	Bldg. Gnd.	Less than 6.0 VDC	N/A

Table 8-18: RRM Test points and Voltages

* After the first reader is connected these voltages will modulate due to data on the line.

Most Digital Volt Meters should indicate about 2.0 VDC.

Power-Up Self-Test on the RRM

The Remote Relay Module should always be tested after installation. The indicators for the RRM are the red LED's located on the component board. The LED's will light as follows:

LED	Description
A	ON at power-up
B	ON when successful RAM test is finished
C	ON when successful PROM test and initialization completed
ON	ON when Power is applied

Table 8-19: Power-up LED Indicators on the RRM

After all three LED's have lit, LED B will flash at a 1 Hz rate.

Normal Operation Test on the RRM

The operation and status LED's will light as follows:

LED	Description
A	ON steady when board is Online with the ACU controller
B	Heart beat 1 flash per second
C	Flashing when board is Off-Line
Tx	Flashing when transmitting data to ACU
Rx	Flashing when receiving data from ACU
ON	ON when Power is applied
LED's 1 - 16	One LED per Relay LED is ON when relay is energized

Table 8-20: Normal LED Indicators on the RRM

Voltage Test on 4-AMP Power Supply/Charge Assembly

Use a voltmeter to measure the DC output as shown in Figure 8-1.

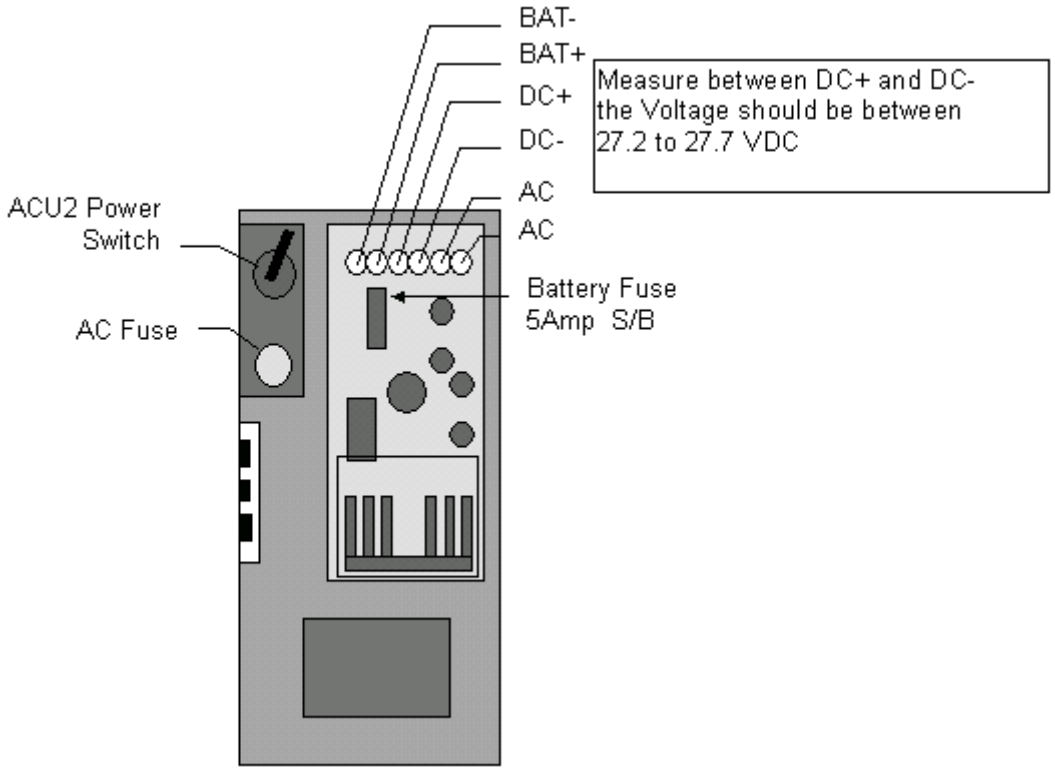

Figure 8-1: Measuring DC Voltage on 4-Amp Power Supply/Charger

Normal Operation For 4-AMP Power Supply

The operation and status LED's will light as follows:

LED	Description
Green	ON when AC Power is present
Red	ON when DC power is present (Does not mean 5-Amp Fuse is Good)

Table 8-21: Normal LED Indicators on the 4-Amp Power Supply

Voltage Test on 8-AMP Power Supply/Charger Assembly

Use a voltmeter to measure the DC output as shown in Figure 8-2.

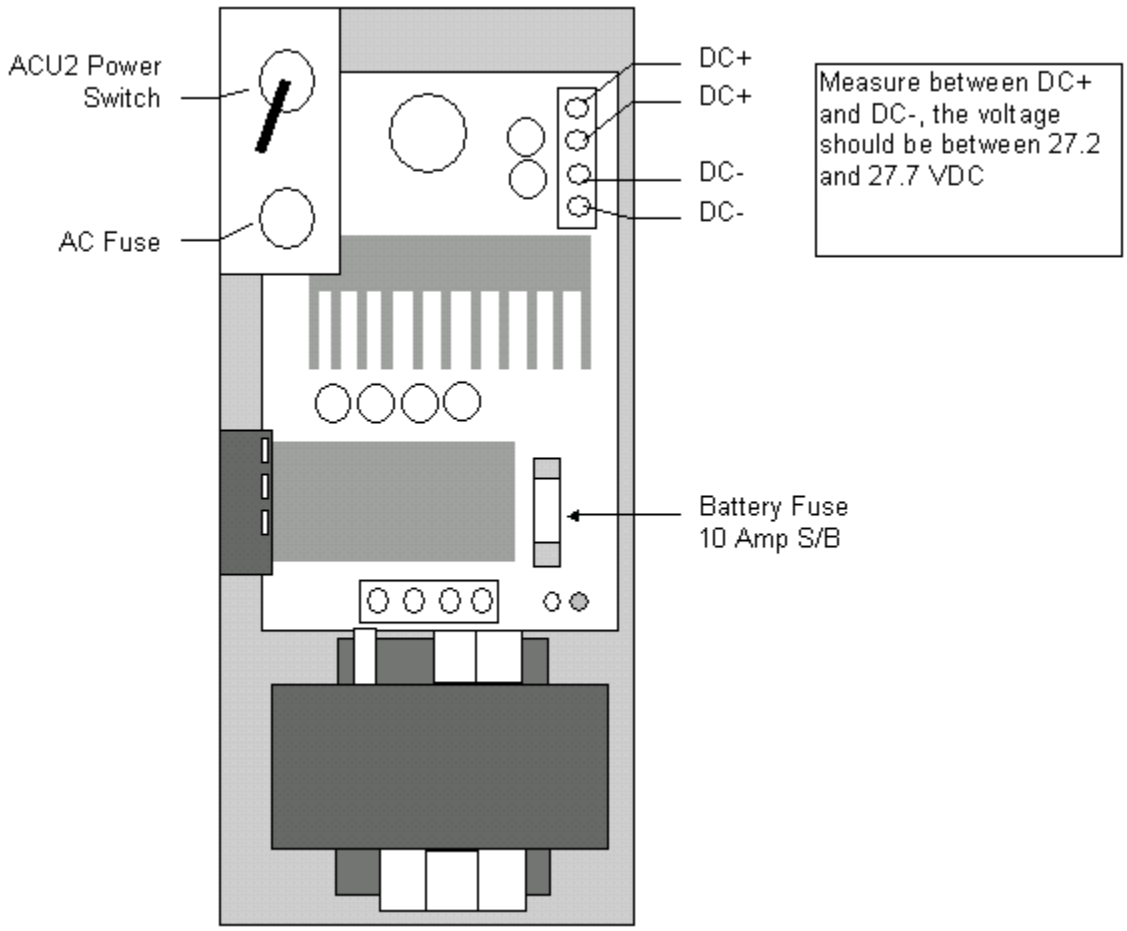

Figure 8-2: Measuring DC Voltage on 8-Amp Power Supply/Charger

Normal Operation For 8-AMP Power Supply

The operation and status LED's will light as follows:

LED	Description
Green	ON when AC Power is present
Red	ON when DC power is present (Does not mean 10-Amp Fuse is Good)

Table 8-22: Normal LED Indicators on the 8-Amp Power Supply

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Chapter 9

Maintenance

General

This section contains the basic maintenance information needed to service the ACU system components. Most maintenance service involves replacing a hardware assembly or printed circuit board. With the exception of certain PROMs, it is suggested that no attempt be made by the user to service the system to the chip level.

Preventive Maintenance

Since the ACU system components are composed of electronic devices, they require no regularly scheduled maintenance, other than cleaning and checking the batteries as described in the following sections.

Read Head Cleaning (Magnetic Only)

Dust and dirt may impair the performance of the card read head mechanism. Where possible, the readers should be placed in a position offering protection from wind-blown particles. It still may be necessary to periodically clean the read head mechanism of dirt and foreign material.

A cleaning kit for card readers (GE Security part number IGR-MAGCLN-KIT) is available. The procedure for cleaning the read head mechanism with the cleaning kit is as follows:

CAUTION:

NEVER insert any hard object other than the magnetic access card into the reader card slot. This could result in severe damage to the read head and/or mounting assembly.

Wet a strip approximately 1 in (25 mm) wide along one edge of the textured side of the head cleaning card. Use the squeeze-bottle of the head-cleaning solution found with the cleaning kit.

Pass the wet edge of the cleaning card through the reader slot from top to bottom in the same manner as a regular access card (with the textured side to the right).

Repeat step 2 using the dry edge of the cleaning card to remove any stubborn contaminates.

Repeat steps 1 through 3 until the read head is clean (no additional contaminants appear on the cleaning card).

Enclosure Cleaning

In order to reduce the cost of repairs and keep the ACU system components downtime to a minimum, the enclosures should be kept clean. See Table A-13 for current GE part numbers. Perform the following procedure once every three months:

Warning:

DO NOT apply electrical power to the ACU controller while it is being maintained. Make certain the 120/240 VAC power source circuit breaker is turned OFF until after the maintenance has been completed (all procedure steps completed). If this WARNING: is not observed, personal injury or death could occur, or the equipment could be damaged.

1. Turn OFF the 120/240 VAC power source to the ACU controller.
2. Unlock and open the front panel of the ACU controller.
3. Turn off DC Out Switch
4. If the batteries are installed, disconnect the WHT/RED wire (Figure 2-17) battery terminal (gently pull the wire connector from the battery terminal). This must be done to remove DC power source from the ACU controller PCB assembly.

CAUTION:

DO NOT use a vacuum cleaner to clean the ACU controller PCB assembly (Figure 2-1). If this is done, static-sensitive devices on the assembly could be destroyed.

5. Use a vacuum cleaner to collect dirt accumulated within the enclosure.
6. Reconnect the WHT/RED wire (disconnected in step 3) to the (+) battery terminal.
7. Turn on DC Out Switch

NOTE: If other preventive maintenance is to be performed, proceed to the applicable procedure, otherwise proceed to step 8.

8. Close and lock the front panel.
9. Reapply AC power (removed in step 1) to the ACU controller.

Checking The Batteries

Warning:

The ACU controller enclosure contains electrical shock potential. Be careful not to touch circuits that contain these potentials. If this WARNING: is not observed, death or personal injury could result, or the equipment could be damaged.

1. Unlock and open the front panel of the ACU controller.
2. Inspect the two batteries for corrosion.

   If it is determined that the batteries need to be replaced, refer to "Replacing ACU Batteries".

   If other preventive maintenance is to be performed, proceed to the applicable procedure.

   If the batteries do not have to be replaced, proceed to step 3.
3. Close and lock the front panel.

Warning:

The ACU controller enclosure contains electrical shock potential. Be careful not to touch circuits that contain these potentials. If this WARNING: is not observed, death or personal injury could result, or the equipment could be damaged.

4. Unlock and open the front panel of the ACU controller.
5. Use a voltmeter to test the output of the two batteries (see Table 9-1). (Refer to "Replacing ACU Batteries" section if the batteries require replacing.)

Output	Charging / Discharging / No Load	Output Voltage
24 VDC	Charging Voltage (ac ON) Discharging Voltage (ac OFF) No Load Voltage	27.2 to 27.6 VDC 20 to 27 VDC 23 to 27 VDC
NOTE: A single battery may also be tested for 12 VDC.		

Table 9-1: Output DC Voltage(s) on the ACU Batteries

Checking Batteries Without Power

Warning:

DO NOT apply electrical power to the ACU controller while it is being maintained. Make certain that the 120/240 VAC power source circuit breaker is turned OFF until after the maintenance has been completed (all procedure steps completed). If this WARNING: is not observed, personal injury or death could occur, or the equipment could be damaged.

1. Unlock and open the front panel of the ACU controller.
2. Observe that the LED's are operating and that power is being supplied to the ACU controller.
3. Turn OFF the 120/240 VAC power source to the ACU controller.
4. Observe that the LED's are operating and that power is being supplied to the ACU controller. Verify at the control center that it has received an "AC POWER FAILURE" alarm from the ACU controller under test. (The power now is being supplied by the UPS batteries.)
5. Allow the ACU controller to operate with the DC power for 5 minutes. If a more rigorous test of backup availability is desired, operate with the DC power from ½-hour to 4 hours (time should never exceed 6 hours).

NOTE: If it is determined that the batteries need to be replaced (batteries cannot supply adequate power to operate ACU controller), refer to "Replacing ACU Batteries" section.

If other preventive maintenance is to be performed, proceed to the applicable procedure.

If the batteries do not have to be replaced (and before power is reapplied to the ACU, verify at the control center that NO "LOW BATTERY" alarm has been received from the ACU controller under test), proceed to step 6.

6. Reapply AC power source (turned OFF in step 3) to the ACU controller.
7. Observe that the LED's are operating and that power is being supplied to the ACU controller. Verify at the control center that it has received an "AC POWER FAILURE" cancel from the ACU controller under test.
8. Close and lock the front panel.

NOTE: ACU Alarm Reporting Voltage Levels for AC fail is 24 VDC for low battery is 21 VDC.

Troubleshooting The ACU Controller

Troubleshooting the ACU controller is done at the printed circuit board and assembly level. DO NOT attempt to replace any of the printed circuit board components unless it is specified in the replacement procedures.

Troubleshooting the ACU controller's PCB assembly is accomplished by performing the procedure in the "Power-Up Self-Test on the ACU controller" in section 8.

If the ACU controller passes the power-up test, perform the troubleshooting procedures for the associated host computer as described in the host computer's maintenance manual and online tests as described in "Online Tests on the ACU controller" in section 8.

Auxiliary Power Supply

In most cases the ACU can supply the power for the. When the ACU cannot supply power an auxiliary power supply may be used. When using an auxiliary power supply make sure the 0V terminal on all Remote modules are connected back to the auxiliary power supply. Failure to do so may result in failure to communicate, interment communication or card reads.

Replaceable Parts

Table 9-2 lists the replaceable parts in the ACU2 controller and the section heading referencing the replacement procedure for each unit.r

Replaceable Part	Part Number	Section Heading
Controller Printed Circuit Board Assembly (PCB)	ACU-RS02B	Replacing ACU2 PCB Assembly
Power Supply Assembly, 4-Amp	ACU-5APWR	Replacing ACU2 Controller Power Supply/ Charger Assembly
Power/Supply Charger Assembly, 8-Amp	ACU-8APWR	Replacing ACU2 Controller Power Supply/ Charger Assembly
Battery, Rechargeable 12 VDC, 7 Amp-hr	ACU-BAT07	Replacing ACU2 Batteries
4 AMP Power Supply; Power Supply Fuse (ac input) For 125 VAC operation use: 2.0 A, 250 V Slow-Blow. For 240 VAC operation use: 1.0 A, 250V Slow-Blow. Located in ACU2 Power/Supply Charger	For 120 VAC use 110627 For 240 VAC use 122038	Obsolete
4 AMP Power Supply**;** Power Supply Fuse (battery) 5.0 A 250 V Slow-Blow Located on ACU2 Power Supply/Charger PCB	122020	Obsolete
8 AMP Power Supply; Power Supply Fuse (ac input) For 125 VAC operation use: 4.0 A, 250 V Slow-Blow. For 240 VAC operation use: 2.0 A, 250V Slow-Blow. Located in ACU2 Power/Supply Charger	For 120 VAC use 126161 For 240 VAC use 110627	Obsolete
8 AMP Power Supply; Power Supply Fuse (battery) 10.0 A 250 V Slow-Blow Located on ACU2 Power Supply/ Charger PCB	128508	Obsolete

Table 9-2: Replaceable Parts on the ACU2 Controller

Replacing ACU2 PCB Assembly

If troubles have been isolated to a faulty ACU2 PCB assembly (part number ACU-XL16B), the assembly should be replaced with a known good spare and the faulty assembly returned to GE Security.

The procedure for replacing an ACU2 PCB assembly is as follows:

Warning:

DO NOT apply electrical power to the ACU2 controller while the ACU2 PCB assembly is being replaced. Make certain that the 120/240 VAC power source circuit breaker is turned OFF BEFORE replacement procedure has been started and remains OFF until AFTER the replacement (all procedure steps completed). If this WARNING: is not observed, death or personal injury could result, or the equipment could be damaged.

1. Turn OFF the 120/240 VAC power source to the ACU2 controller.
2. Unlock and open the front panel of the ACU2 controller.
3. If the batteries are installed, disconnect the WHT/RED wire (Figure 2-17) battery terminal (gently pull the wire connector from the battery terminal). *This must be done to remove DC power source from the ACU2 Power Supply.*
4. Turn off DC Out Switch.

NOTES:

- Make sure the ACU2 PCB assembly to be replaced was properly wired (correct wires going to correct terminal blocks).
- Be sure to note the orientation of the terminal blocks so that they may be placed on the replacement ACU2 PCB assembly in the same position.

5. Be sure to note the switch (SW1, SW2 and SW50) settings and jumper settings, set the switch settings and jumper settings on the replacement PCB in the required positions.

CAUTION:

The printed circuit boards or modules contain static-susceptible devices. Prior to handling them, be sure to follow the two rules below to avoid damaging these devices by static electricity.

Handle all static-sensitive components at a static-safeguarded work area.

Transport all static-sensitive components in static-shield containers or packages.

6. Unplug TB1 (Yellow), TB2 (Pink), TB3 (Green), TB4 (Blue) TB5 and TB6 terminal connectors from the ACU2 PCB Assembly.
7. Pull (gently) the ACU2 PCB assembly from each of the snap-in supports and remove the assembly from the enclosure.

NOTE: Refer to "Changing/Installing PROMs" if replacement ACU2 PCB assembly requires the installation of PROM U7. If the replacement ACU2 PCB assembly already has the required PROM, proceed to step 8.

8. Transfer PROM U7 from the removed ACU2 PCB assembly to the replacement ACU2 PCB assembly. See Changing/Replacing PROMs in this section.
9. Position the replacement ACU2 PCB assembly on the supports with a support in each hole in the

end of the assembly.

10. Press on the ACU2 PCB assembly at each support until ACU2 PCB assembly firmly rests in place on the support.
11. Reconnect TB1 (YELLOW), TB2 (PINK), TB3 (GREEN), TB4 (BLUE) TB5 and TB6 terminal connectors to matching color terminal blocks on the replacement ACU2 PCB assembly.

Warning:

The ACU2 controller enclosure contains electrical shock potential. Be careful not to touch circuits that contain these potentials. If this WARNING: is not observed, death or personal injury could result, or the equipment could be damaged.

12. Reconnect the WHT/RED wire (Figure 2-17) removed in step 3 to the (+) battery terminal. *The battery DC power source is now being supplied to the ACU2 controller.*
13. Turn on DC Out Switch.
14. Reapply the 120/240 VAC power (removed in step 1) to ACU2 controller.
15. Perform test procedures as described in "Power-Up Self Test on ACU2 Controller" and "Online Tests on ACU2 Controller" sections.
16. Close and lock the front panel of the ACU2 controller.

Replacing ACU2 Controller Power Supply/Charger Assembly

The procedure for replacing the 4-Amp and 8-Amp power supply/charger assembly is as follows:

Use a voltmeter to measure the DC output as shown in Figure 9-1, if there is a suspected fault in the power supply/charger.

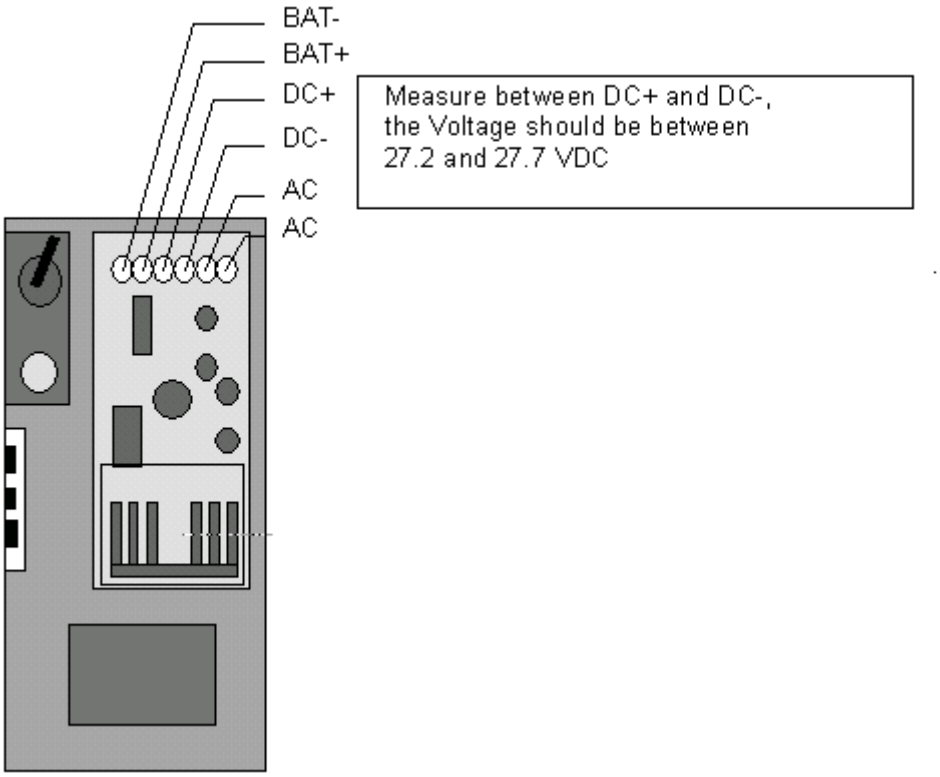


Figure 9-1: Measuring DC Voltage on Power Supply/Charger

If troubles are isolated to a faulty power supply/charger assembly, replace the faulty unit with a known good spare. Return the faulty unit to GE Security.

Warning:

DO NOT apply electrical power to the controller while replacing the power supply/ charger assembly. Verify that the 120/240 VAC power source circuit breaker is OFF before starting replacement procedures and remains OFF until after all replacement steps are complete. Death, personal injury, or equipment damaged could result if this WARNING: is not observed.

1. Turn OFF the 120/240 VAC power source to the ACU2 controller.
2. Unlock and open the front panel of the ACU2 controller.
3. Turn off the ACU2 power switch.
4. If the batteries are installed, disconnect all wires (Figure 2-17) from battery terminals (gently pull the wire connector from the battery terminal). *This must be done to remove DC power source from the ACU2 Power Supply.*

NOTE: Retain all mounting hardware.

5. Remove the Terminal Block TB1 clip-on cover barrier on the ACU2 Controller Power Supply/Charger Assembly (Figure 2-17).
6. Tag and disconnect the three wires for the AC power source (black, white, and green for 120 VAC or black red and green for 240 VAC).
7. Tag and disconnect the wiring from the PCB Controller Assembly and optional back-up batteries.

NOTE: Be sure to note that power supply/charger assembly's DC (-) wire (YELLOW for 4-Amp, BLACK for 8-Amp) is connected to the mounting hardware on the upper right-hand side of the power supply/charger assembly

8. Loosen and remove the mounting hardware securing the power supply/charger mounting plate to the enclosure.

   Remove the power supply/charger assembly.

9. Position the replacement power supply/charger assembly onto the panel mounting and secure with the mounting hardware removed in step 7.

NOTE: Be sure to reconnect the DC (-) wire (YELLOW for 4-Amp, BLACK for 8-Amp) to the mounting hardware on the upper right-hand side of the power supply/charger assembly.

10. Reconnect the wiring to the PCB Controller Assembly and back-up batteries (*except the WHT/RED wire to battery (+) terminal*) disconnected in step 3.
11. Reconnect the wiring according to local electrical code to Terminal Block TB1 (removed in step 5).
12. Install the clip-on cover barrier on TB1 removed in step 4.

    If applicable, reconnect the WHT/RED wire (Figure 2-17) removed in step 3 to the (+) battery terminal. *The battery DC power source is now being supplied to the ACU2 controller*.

13. Reapply the 120/240 VAC power (removed in step 1) to ACU2 controller.
14. Perform test procedures as describe in the "Power-Up Self Test on ACU2 Controller" and "Online Tests on ACU2 Controller" sections.

    Verify the Power Supply/Charger output voltage Figure 9-1.

15. Close and lock the front panel of the ACU2 controller.

Replacing Batteries

1. Turn OFF the 120/240 VAC power source to the ACU2 controller. *The power source is now supplied by the UPS batteries*.
2. Unlock and open the front panel of the ACU2 controller.
3. Tag and disconnect the wiring from both battery terminals.
4. Loosen and remove the screw, split-lock, and flat washer from the battery strap bracket on the batteries (Figure 2-18 and Figure 2-21).

NOTE: NEVER replace only one battery - ALWAYS replace BOTH batteries at the same time.

5. Remove BOTH batteries from the enclosure.
6. Install the two replacement batteries on the battery shelf (Figure 2-21).
7. Place the battery strap bracket onto the batteries and secure the battery strap bracket with the hardware removed in step 4.
8. Reconnect the battery wiring disconnected in step 3. *The power source is now supplied by the UPS batteries*.
9. Reapply AC power source removed in step 1.
10. Close and lock the front panel.

Warning:

The ACU2 enclosure contains electrical shock potential. Be careful not to touch circuits that contain these potentials. If this WARNING: is not observed, death or personal injury could result, or the equipment could be damaged.

If the batteries are suspected of being faulty, refer to "Checking the DC Voltage of the ACU2 Batteries" section.

Warning:

Danger - Explosive Gases

Can Cause Blindness or Severe Injury.

Use in a well ventilated area away from open flame, cigarettes, sparks, and other sources of ignition.

Shield eyes and face when working around battery.

Do not make direct contact between the positive and negative terminals.

Dispose of in accordance with environmental regulations.

Poison – Contains Lead compounds and corrosive acid.

Contains sulfuric acid and can cause severe burns. In the event of contact flush with water and obtain immediate medical attention.

Observe all batteries manufacturer’s instructions.

Keep out of reach of children.

Re-Charge in accordance with manufacturer’s instructions.

Replacing The Tamper Switch

Warning:

The ACU2 controller enclosure contains electrical shock potential. Be careful not to touch circuits that contain these potentials. If this WARNING: is not observed, death or personal injury could result, or the equipment could be damaged.

1. Turn OFF the 120/240 VAC power source to the ACU2 controller. The power source is now supplied by the optional UPS batteries if installed.
2. Unlock and open the front panel of the ACU2 controller.
3. Turn off ACU2 power switch.
4. Loosen the mounting hardware securing the tamper switch assembly (Figure 2-1) and remove the assembly from the enclosure.
5. Tag and disconnect the wiring from the defective tamper switch.
6. Loosen the mounting hardware securing the tamper switch to the mounting bracket and remove the tamper switch.
7. Position and secure the replacement tamper switch onto the mounting bracket with the mounting hardware removed in step 6.
8. Reconnect the tamper wiring (removed in step 5) onto the replacement tamper switch.
9. Position and secure the tamper switch assembly to the enclosure with the mounting hardware removed in step 4.
10. Turn on ACU2 power switch.
11. Reapply AC power source removed in step 1.
12. Close and open the ACU2 controller front panel to check the operation of the tamper switch.
13. Close and lock the front panel.

PROM Replacement

Newer ACU panels do not require PROM replacement to update the firmware, instead the PROM can be flashed. Check the Panel Status on the Server PC, to see if it shows FLASH. To Flash a PROM see *PROM Control* in the Diamond II manual or *Load Panel Program* in Sapphire Pro and Topaz manuals

This section contains instructions for identifying and changing/adding PROMs and DES chip. See Figure 9-2 for their locations on the ACU2 PCB assembly. When the PROM on the ACU2 is inserted correctly, the label will appear upside down.

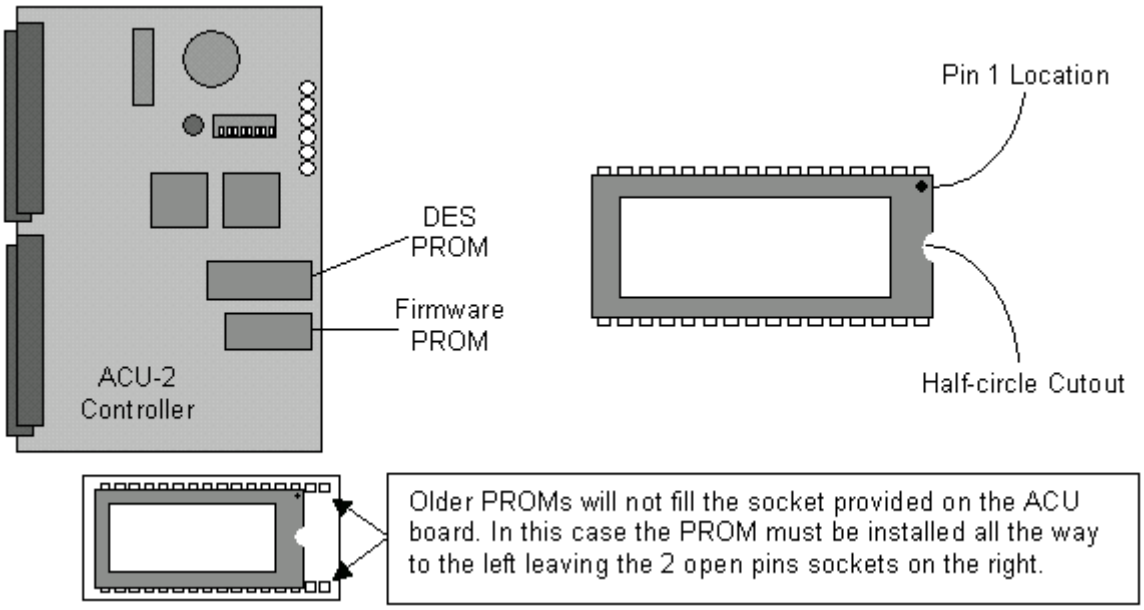

DES
PROM
Firmware
PROM
ACU-2
Controller
Pin 1 Location
Half-circle Cutout
Older PROMs will not fill the socket provided on the ACU board. In this case the PROM must be installed all the way to the left leaving the 2 open pins sockets on the right.

Figure 9-2: Location of PROM and DES Encryption Sockets on ACU2 PCB Assembly

PROM Identification

The ACU2 PCB Controller Assembly contains a PROM. The programs reside in a PROM. There may be occasions when the user may need to change or identify a PROM. Each PROM has a label similar to the example shown in Figure 9-3.

Except for socket number (location), all PROM labels in a program set are identified in the same manner. The labels contain (as shown in Figure 9-3) the following information:

- PROM PART NUMBER/ISSUE LEVEL: The PROM part number is PL-134659 and the -C is the issue level.
- MODULE IDENTIFICATION: Assembly name plus the PROM socket number on the assembly.
- GE Security PROGRAM IDENTIFICATION: ACU2256RF
- PROGRAM CHECKSUM: CC99 (used for diagnostics)
- COPYRIGHT: Year the PROM was produced.

Figure 9-3: PROM Identification Label Example

PROM Installation

The user should exercise **CAUTION:** when inserting a PROM into a socket. The pins bend easily and the PROM could be damaged. A PROM that is installed incorrectly will be damaged when the equipment is powered up. See Table A-13 for current GE part numbers.

CAUTION:

Prior to handling PROMs and the circuitry of the ACU2 controller (and Readers), be sure to follow the two rules below to avoid damaging PROMs by static electricity:

Handle all static-sensitive components at a static-safeguarded work area.

Transport all static-sensitive components in static-shield containers or packages.

Refer to Figure 9-2 while following the explanation below:

1. Locate the PROM pin 1. Some PROMs have a dot on the top (Figure 9-2) to indicate the first pin location. Some PROMs have a small half-circle cutout on one end of the PROM (Figure 9-2) to indicate the first pin.
2. Locate Pin 1 on the ACU2 board. One end of the socket will have a half-circle cutout to indicate pin 1.
3. Carefully insert the PROM into the far left side of the socket.

   When the PROM is properly seated in its socket, the PROM label will appear upside down.

Troubleshooting The One-Stage Reader

Troubleshooting the One-Stage Reader is accomplished by performing the procedures, “One-Stage Reader Field Wiring Test”, "Power-up Self-Test on the One-Stage Reader" and "Normal Operation Test on the One-Stage Reader" found in Section 8 of this manual.

Replacing The One-Stage Reader

This procedure enables the user to replace the One-Stage Reader.

Warning:

Be sure to remove all power from the One-Stage Reader to avoid personal injury or damage to the unit.

1. Remove all power from the One-Stage Reader (at the ACU2 controller or other auxiliary power source).
2. Unscrew the One-Stage Reader.

CAUTION:

The printed circuit boards or modules contain static-susceptible devices. Prior to handling them, be sure to follow the two rules below to avoid damaging these devices by static electricity.

Handle all static-sensitive components at a static-safeguarded work area.

Transport all static-sensitive components in static-shield containers or packages.

3. Remove the One-Stage Reader from the mounting plate.

4. Tag the wiring and note the orientation of the terminal connector TB1 (Figure 4-4) on the One-Stage Reader.
5. Disconnect the terminal connector.
6. Note the positions of the switches on DIP switch (SW2) (Figure 4-4).
7. Note the revision level of PROM (Figure 9-3) located on the One-Stage Reader (Figure 4-4). *The revision letter should be the same or higher.* Refer to "Installing a PROM" section if applicable.
8. Set the switches on DIP switch (SW2) on the replacement reader to the same positions as noted in step 6 (or as required).
9. Reconnect the terminal connector disconnected in step 5.
10. Position and secure the replacement reader onto the mounting plate.
11. Perform "Power-up Self-Test on the One-Stage Reader" and "Normal Operation Test on the One-Stage Reader" found in Section 5 of this manual.

NOTE: See "Adjusting the One-Stage Reader LCD Display Brightness" found in the One-Stage Reader section if the user desires to change the adjustment.

Parts Replacement On The One-Stage Reader

Part No.	Description
133494	12 key membrane keypad for non-backlit LCD display
134802	12 key membrane keypad for backlit LCD display
133376	12 key Keypad membrane without LCD Window One-Stage Reader
134785	Magnetic Stripe Read Head for RMS Readers
133373	Wiegand Effect Read Head for RWE Readers
134922-1	Proximity Read Head for RPX Readers
126627	Cleaning Kit for Magnetic Stripe Readers
134815	RMS-10 Magnetic. Stripe Reader, Door Frame (new style)

Table 9-3: Parts replacement chart for One-Stage Reader

NOTE: RMS-1 Magnetic Reader without LCD display

RMS-2 Magnetic Reader with LCD display

RWE-1 Wiegand Reader without LCD display

RWE-2 Wiegand Reader with LCD display

RPX-1 Proximity Reader without display

RPX-2 Proximity Reader with LCD display

RRE Troubleshooting

Troubleshooting the RRE is accomplished by performing the procedures, “RRE Field Wiring Test”, "Power-up Self-Test on the RRE" and "Normal Operation Test on the RRE" found in Section 8 of this manual.

RRE Replacement

This procedure enables the user to replace the RRE.

Warning:

Be sure to remove all power from the RRE to avoid personal injury or damage to the unit.

1. Remove all power from the RRE (from the ACU2 controller or other auxiliary power source).
2. Open RRE cover to access the wiring.

CAUTION:

The printed circuit boards or modules contain static-susceptible devices. Prior to handling them, be sure to follow the two rules below to avoid damaging these devices by static electricity.

Handle all static-sensitive components at a static-safeguarded work area.

Transport all static-sensitive components in static-shield containers or packages.

3. Note the positions of the switches on DIP switch (SW1) (Figure 5-2). Set the switch settings on the replacement PCB to the required positions.
4. Unplug TB1, TB2, and TB3 terminal connectors from the RRE (Figure 5-2).
5. Note the revision level of PROM U2 (Figure 5-2) located on the RRE. The revision letter should be the same or higher. Refer to "Installing a PROM" section if applicable.
6. Pull (gently) the RRE circuit board from each of the snap-in standoffs and remove the circuit board.
7. Position the replacement circuit board on the snap-in standoffs until the circuit board firmly rests in place on the standoffs.
8. Reconnect the terminal connectors removed in steps 4.
9. Perform "Power-up Self-Test on the RRE" and "Normal Operation Test on the RRE" found in Section 8 of this manual.

RRE Parts Replacement

133652	RRE Printed Circuit Board Assembly
134972	RRE HP Printed Circuit Board Assembly

Table 9-4: Parts replacement chart for RRE

Replacing The SMT RIM

This procedure enables the user to replace the SMT RIM.

Warning:

Be sure to remove all power from the SMT RIM to avoid personal injury or damage to the unit.

1. Remove all power from the SMT RIM (from the ACU2 controller or other auxiliary power source).
2. Open SMT RIM cover to access the wiring.

CAUTION:

The printed circuit boards or modules contain static-susceptible devices. Prior to handling them, be sure to follow the two rules below to avoid damaging these devices by static electricity.

Handle all static-sensitive components at a static-safeguarded work area.

Transport all static-sensitive components in static-shield containers or packages.

3. Note the orientation and disconnect ribbon cable on the SMT RIM.
4. Note the positions of the switches on DIP switch (Figure 6-3). Set the switch settings on the replacement PCB to the required positions.
5. Note the revision level of PROM U3 located on the SMT RIM (Figure 6-3). The revision letter should be the same or higher. Refer to "Installing a PROM" section if applicable.
6. Pull (gently) the SMT RIM circuit board from each of the snap-in standoffs and remove the circuit board.
7. Position the replacement circuit board on the snap-in standoffs until the circuit board firmly rests in place on the standoffs.
8. Reconnect the ribbon cable removed in step 3.
9. Perform "Power-up Self-Test on the SMT RIM" and "Normal Operation Test on the SMT RIM" found in Section 8 of this manual.

SMT RIM Parts Replacement

ACU-RIMTB	RIM16-E1L Termination Board, Printed Circuit Board Assembly
ACU-RIMBO	RIM16-E1L Electronic board, Printed Circuit Board Assembly
ACU-RIMRC	RIM16-E1L Cable from Terminal Board to Electronics Board

Table 9-5: Parts replacement chart for RIM16-E1L

Replacing The SMT RRM

This procedure enables the user to replace the SMT RRM.

Warning:

Be sure to remove all power from the SMT RRM to avoid personal injury or damage to the unit.

1. Remove all power from the SMT RRM (from the ACU2 controller or other auxiliary power source).
2. Open SMT RRM cover to access the wiring.

CAUTION:

The printed circuit boards or modules contain static-susceptible devices. Prior to handling them, be sure to follow the two rules below to avoid damaging these devices by static electricity.

Handle all static-sensitive components at a static-safeguarded work area.

Transport all static-sensitive components in static-shield containers or packages.

3. Tag and note the orientation of the 6 terminal connectors then disconnect terminal connectors on the SMT RRM.
4. Note the positions of the switches on DIP switch (Figure 7-2). Set the switch settings on the replacement PCB to the required positions.
5. Note the revision level of PROM U1 located on the SMT RRM (Figure 7-2). The revision letter should be the same or higher.
6. Pull (gently) the SMT RRM circuit board from each of the snap-in standoffs and remove the circuit board.
7. Position the replacement circuit board on the snap-in standoffs until the circuit board firmly rests in place on the standoffs.
8. Reconnect the terminal connectors removed in step 3.
9. Perform "Power-up Self-Test on the SMT RRM" and "Normal Operation Test on the SMT RRM" found in Section 8 of this manual.

SMT RRM Parts Replacement

ACU-RRMBO	RRM16-E1L Printed Circuit Board Assembly

Table 9-6: Parts replacement chart for RRM16-E1L

Chapter 10

Elevator Control

Overview

The Elevator Control Software (ECS) is an enhancement that allows the Host/Server software to manage floor access. This feature is turned on in the Field Panel configuration page. The Host Software associates cab and floor numbers with a security area and relay. All currently available ACUs (ACUXL, ACURS2 and ACURS4) support elevator control.

NOTE: ACU devices must have the proper firmware that supports the ECS feature. ECS will not support secondary card access or door control.

The Elevator Control Software (ECS) can support up to 128 elevator cabs even if the cabs are in different buildings. Elevator cabs used in conjunction with this feature should be equipped with card readers, which may or may not have keypads. Additionally, remote control relays within an ACU2 filed panel are interfaced to the elevator control panel. The SCP devices can be networked or non-networked intelligent devices. The maximum number of cabs per ACU2 is four.

ECS controls access to different floors for each cardholder using security area(s)/group and time schedules per card per floor. The software verifies that the cardholder has access to the cab and floor combination. If access is allowed the system will send a momentary relay activation command to the elevator control panel. The activation stops the elevator at the selected floor.

NOTE: Any ACU2 used for Elevator Control must have EPROM version 2.39 or later and ACU2X Version 3.65 or later.

Configuring the Elevator Control is a five-step process:

1. Install the specific hardware that supports the ECS option. Install card readers in the elevator cabs and connect the control relays to the interface of the elevator control panel.
2. Define the Field Panel configuration and all Readers that will be used with the elevator cabs. You can connect up to 4 (four) card readers (one per elevator cab) to the ACU2 and assign them for elevator control. There is no special elevator configuration needed in the Reader Setup.

NOTE: Once an ACU2 is configured for Elevator Control can only be used for Elevator Control.

3. Configure a Security Area for each floor where access is controlled by the elevator cab. These Security Areas are separate from other security areas in that they are only used for elevator control.
4. Define the elevator cabs and floors that are accessible by that cab. Each elevator cab and floor combination is called an elevator control point or ECP. Up to 128 floors can be configured as stops for each ACU2. For more information on this step, see Elevator Relays.
5. Setup and configure the Elevator Public Access itself.

ACU Field Panel Relay Installation

The ACU2 field panel has 12 onboard relays (0-11) that may be used for floor control. In addition, eight (8) RRMs can be installed on the ACU2 Increasing the number of relays to 128. If Floor Tracking is going to be used, only four RRMs for a total of 76 relays available to Elevator Control and four RIMs (connected only to port 1 of the ACU) will be used for floor selecting feedback. The relay numbering will be different depending on which ACU is used (see the relay numbering chart below).

The example below is using an ACU2 with one RRM (Address 4 Port 2). The Elevator Control Mode is Standard Mode. There are three Elevator Cabs controlling four floors each. Each Relay would be given a Security Area for access authorization. Each elevator cab must have its own reader. When a card is read in Elevator Cab 2 and the user has access to Areas “Floor 2” and “Floor 3” only relays 4 and 5 would operate.

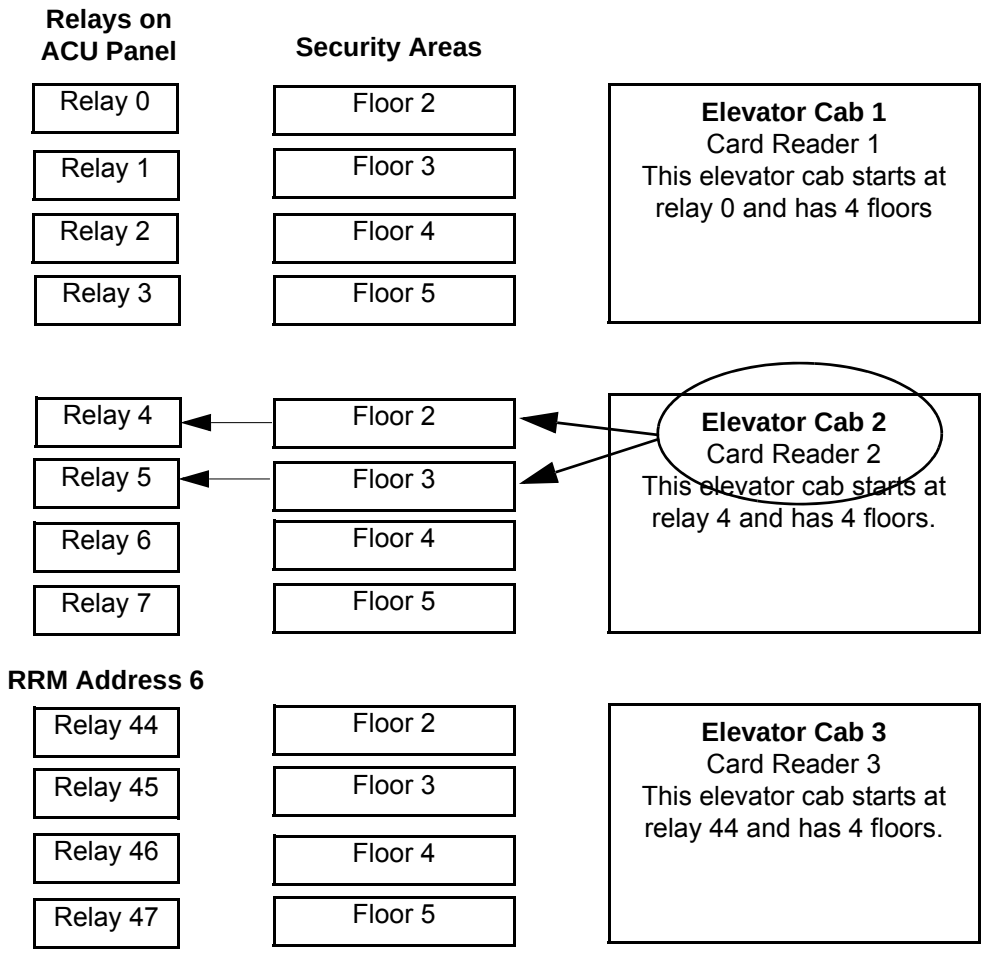


Figure 10-1: Elevator Control Relay Assignment Example

NOTE: Some older elevators require the relay to be activated longer. If this is necessary, in the software set the Door Bounce Timer to 2 seconds. This should take care of any additional delay required by the elevator. Requires ACU firmware version 5.72 or later.

Elevator Relay Numbering for Standard Mode

Relay #	Physical Location of Relays
0 – 11	0 – 11 on ACU2 Controller
12 – 27	1 – 16 on RRM Address 4 on Reader port 2
28 – 43	1 – 16 on RRM Address 5 on Reader port 2
44 – 59	1 – 16 on RRM Address 6 on Reader port 2
60 – 75	1 – 16 on RRM Address 7 on Reader port 2
76 – 91	1 – 16 on RRM Address 4 on Reader port 1
92 – 107	1 – 16 on RRM Address 5 on Reader port 1
108 – 123	1 – 16 on RRM Address 6 on Reader port 1
124 – 127	1 – 4 on RRM Address 7 on Reader port 1

Table 10-1: Elevator Relay Numbering for Standard Mode

If an address is skipped you must also skip the numbers as well.

NOTE: When an ACU is used for Elevator Control, all of its relays are set to energized when not selected. If the ACU were to fail, all floors will be enabled. (Fail Safe)

Elevator Relay Numbering for Floor Tracking

Relay #	Physical Location of Relays	Alarm Inputs for Floor Tracking
0 - 11	0-11 on ACU 2 Controller	0-11 on ACU 2 Controller
12 - 27	1 - 16 on RRM Address 4 on Reader Port 2	1 - 16 on RIM Address 4 on Reader Port 1
28 - 43	1 - 16 on RRM Address 5 on Reader Port 2	1 - 16 on RIM Address 5 on Reader Port 1
44 - 59	1 - 16 on RRM Address 6 on Reader Port 2	1 - 16 on RIM Address 6 on Reader Port 1
60 - 75	1 - 16 on RRM Address 7 on Reader Port 2	1 - 16 on RIM Address 7 on Reader Port 1

Table 10-2: Elevator Relay Numbering for Floor Tracking

NOTE: Be certain that the Exp. Module on the Field Panel has the Port 1 Addresses set for INPUT.

Elevator Relay Interface

Elevator companies often choose not to allow installers to handle the elevator wiring directly, instead they provide contacts from the elevator circuit that can be used to interface between SAPPHIRE Pro and the elevator control.

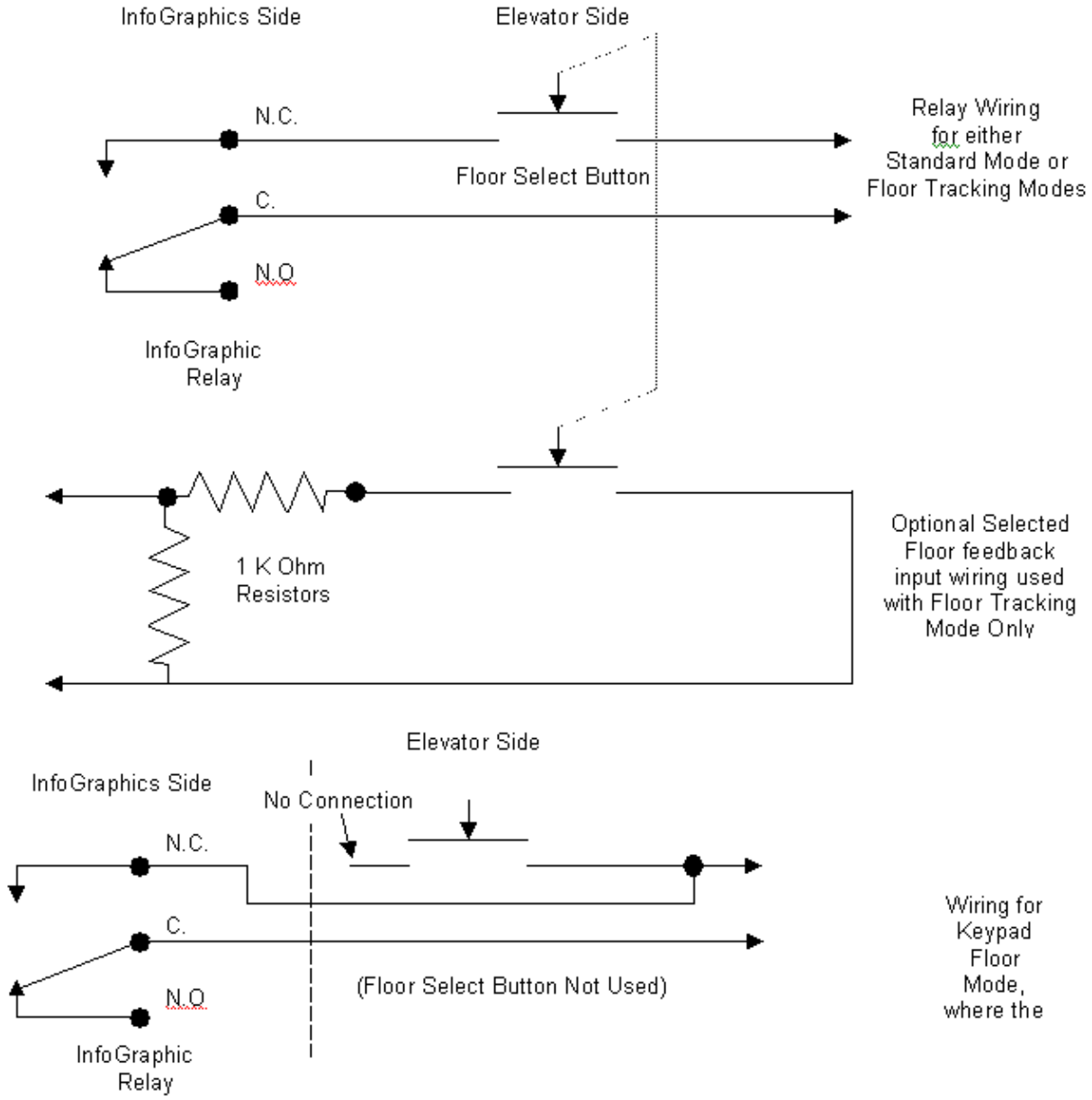


Figure 10-2: Elevator Control Relay Wiring

NOTE: When an ACU is used for Elevator Control, all of its relays are set to energized when not selected. If the ACU were to fail, all floors will be enabled. (Fail Safe).

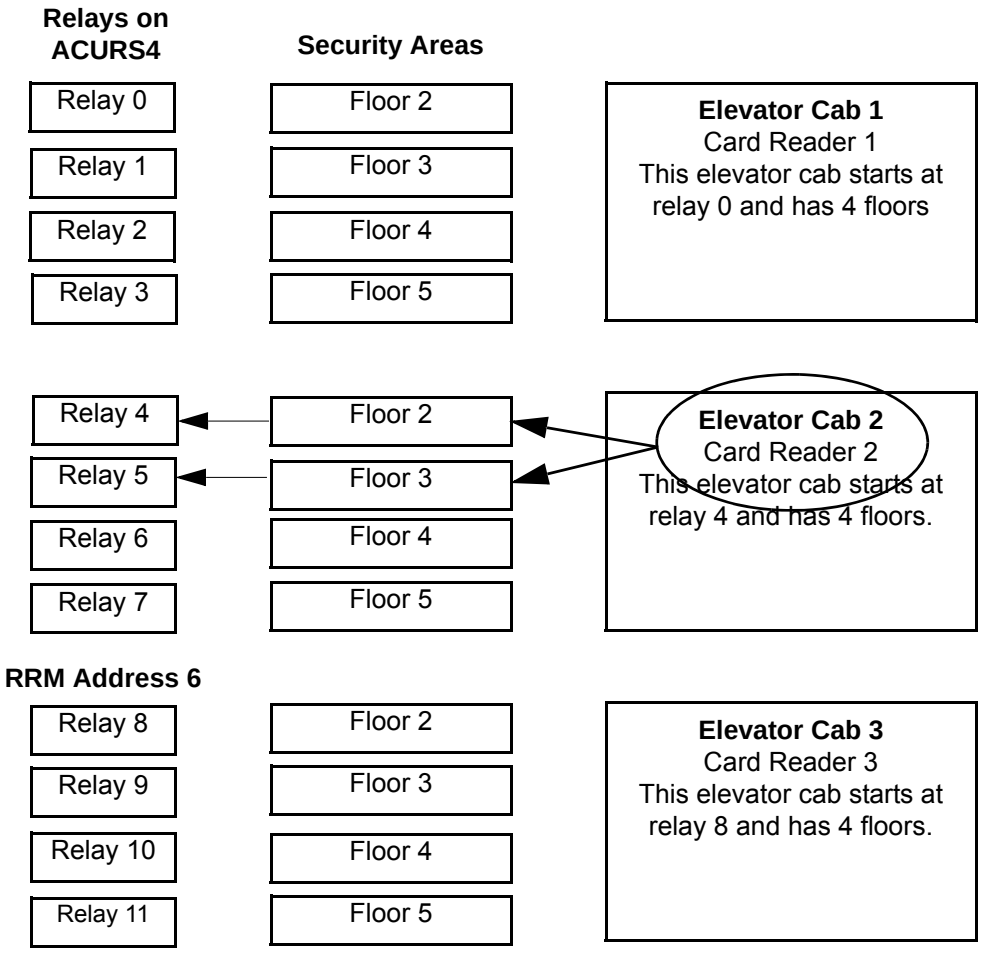
Elevator Control for ACURS2 and ACURS4

Elevator Floor Definition

The ACURS2 field panel has 4 onboard relays and the ACURS4 has 8 onboard relays. The ACURS2 and ACURS4 can have two (2) RRMs added for a maximum of 36 or 40 relays maximum for elevator control. The relay numbering will be different depending on which ACURS is used, see the relay numbering chart on the next page.

The example below is using an ACURS4 with one RRM (addressed #6). There are 3 Elevator Cabs controlling 4 floors each. Each relay would be given a security area for access authorization. Each elevator cab must have its own reader. When a card is read in Elevator Cab 2 and the user has access to areas “Floor 4” and “Floor 5” then only relays 4 and 5 would operate.

NOTE: Only RRMs addressed 6 and 7 can be used for an ACURS that is configured for elevator control.



Elevator Relay and Alarm Input Numbering

Relay Numbering for Elevator Control		
	ACURS2	**ACURS4**
On-board ACURS	0 – 3	0 – 7
RRM Address 6	4 – 19	8 – 23
RRM Address 7	20 - 35	24 - 39

Table 10-3: Relay Numbering for Elevator Control

Floor Tracking Numbering for On Board Relays and Alarm Inputs

Floor Relays	Physical Alarm Input Location		Relay Outputs	Physical Relay Location	
ACURS2 and ACURS4					
0	Reader-0	Z0	0	Reader-0	Strike Relay
1	Reader-0	Z1	1	Reader-0	AUX Relay
2	Reader-0	Z2	2	Reader-1	Strike Relay
3	Reader-1	Z0	3	Reader-1	AUX Relay
ACURS4 Only					
4	Reader-1	Z1	4	Reader-2	Strike Relay
5	Reader-1	Z2	5	Reader-2	AUX Relay
6	Reader-2	Z0	6	Reader-3	Strike Relay
7	Reader-2	Z1	7	Reader-3	AUX Relay

Table 10-4: Elevator Relay Numbering for Floor Tracking

Floor Tracking Relay and Alarm Numbering for RRM and RIM Modules

ACURS2	ACURS4	Physical Location of Relays	Alarm Inputs for Floor Tracking
4-19	8-23	1 - 16 on RRM Address 6	1 - 16 on RIM Address 4
20-35	24-39	1 - 16 on RRM Address 7	1 - 16 on RIM Address 5

Table 10-5: Elevator Relay Numbering for Floor Tracking

Standard Elevator Wiring

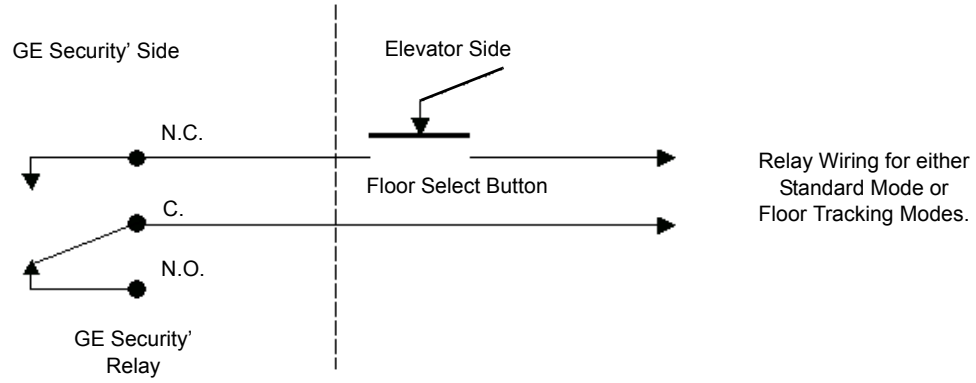


Figure 10-3: Elevator Control Relay Interface

NOTE: When an ACURT is used for elevator control, all of its relays are set to energize when not selected. If the ACURT were to fail, all floors will be enabled (Fail Safe).

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Appendix A

ACU2 Alarm Zone Reporting

Alarm Reporting for Host PC

Alarm reporting for the ACU2 Controller

ACU2 Controller Zone Input	Alarm Number
Z00	0
Z01	1
Z02	2
Z03	3
Z04	4
Z05	5
Z06	6
Z07	7
Z08	8
Z09	9
Z10	10
Z11	11
Low Battery (21 VDC)	12
Cabinet Tamper	14
Power Fault (24 VDC)	15

Table A-1: Alarm zone reporting on the Host PC

ACU2 Controller for the Host PC

Reader	Z0*	Z1*	Z2	Z3
Reader 0	16	17	18	19
Reader 1	20	21	22	23
Reader 2	24	25	26	27
Reader 3	28	29	30	31
Reader 4	32	33	34	35
Reader 5	36	37	38	39
Reader 6	40	41	42	43
Reader 7	44	45	46	47
Following Readers on ACU-2/16 Only				
Reader 8	128	129	130	131
Reader 9	144	145	146	147
Reader 10	160	161	162	163
Reader 11	176	177	178	179
Reader 12	192	193	194	195
Reader 13	208	209	210	211
Reader 14	224	225	226	227
Reader 15	240	241	242	243

Table A-2: Physical alarm zone reporting on the

One-Stage Reader and RRE for Host PC

NOTES:

* Defaults: Z0: Door Contact

Z1: Exit Push Button

If Z0 and Z1 are used for Door Contact and Exit Push Button then the alarm numbers in these columns are used to report a trouble condition at the sensor.

Reader	Door Forced Open	Door Held Open	Reader Tamper	Reader Off-line
Reader 0	64	65	66	67
Reader 1	68	69	70	71
Reader 2	72	73	74	75
Reader 3	76	77	78	79
Reader 4	80	81	82	83
Reader 5	84	85	86	87
Reader 6	88	89	90	91
Reader 7	92	93	94	95
Following Readers on ACU-2/16 Only				
Reader 8	96	97	98	99
Reader 9	100	101	102	103
Reader 10	104	105	106	107
Reader 11	108	109	110	111
Reader 12	112	113	114	115
Reader 13	116	117	118	119
Reader 14	120	121	122	123
Reader 15	124	125	126	127

Table A-3: ACU Reader Logical Alarm Numbers for the Host PC

Alarm Number	Reader port 1 Address 4	Reader port 1 Address 5	Reader port 1 Address 6	Reader port 1 Address 7	Reader port 2 Address 4	Reader port 2 Address 5	Reader port 2 Address 6	Reader port 2 Address 7
I1	97	101	105	109	113	117	121	125
I2	98	102	106	110	114	118	122	126
Remote Module Off-line	99	103	107	111	115	119	123	127

Table A-4: RRM alarm numbers for the Host PC

Zone Input	Reader port 1 Address 4	Reader port 1 Address 5	Reader port 1 Address 6	Reader port 1 Address 7	Reader port 2 Address 4	Reader port 2 Address 5	Reader port 2 Address 6	Reader port 2 Address 7
IN1	128	144	160	176	192	208	224	240
IN2	129	145	161	177	193	209	225	241
IN3	130	146	162	178	194	210	226	242
IN4	131	147	163	179	195	211	227	243
IN5	132	148	164	180	196	212	228	244
IN6	133	149	165	181	197	213	229	245
IN7	134	150	166	182	198	214	230	246
IN8	135	151	167	183	199	215	231	247
IN9	136	152	168	184	200	216	232	248
IN10	137	153	169	185	201	217	233	249
IN11	138	154	170	186	202	218	234	250
IN12	139	155	171	187	203	219	235	251
IN13	140	156	172	188	204	220	236	252
IN14	141	157	173	189	205	221	237	253
IN15	142	158	174	190	206	222	238	254
IN16	143	159	175	191	207	223	239	255
IN17	96	100	104	108	112	116	120	124
IN18	97	101	105	109	113	117	121	125
IN19	98	102	106	110	114	118	122	126
Remote Module Off-line	99	103	107	111	115	119	123	127

Table A-5: RIM alarm numbers for the Host PC

ACU Alarm Reporting Voltage Levels	
Normal	27.5 VDC
AC Fail	24 VDC
Low Battery	21 VDC

Table A-6: ACU Alarm Reporting Voltage Levels

	Physical Alarm Zones				Logical Alarm Zones				
Reader Address	**Zone 0**	**Zone 1**	**Zone 2**	**Zone 3**	**Lock Monitor**	**F.O.**	**H.O.**	**R.T.**	**OFFL**
0	16	17	18	19	48	64	65	66	67
1	20	21	22	23	50	68	69	70	71
2	24	25	26	27	52	72	73	74	75
3	28	29	30	31	54	76	77	78	79
4	32	33	34	35	56	80	81	82	83
5	36	37	38	39	58	84	85	86	87
6	40	41	42	43	60	88	89	90	91
7	44	45	46	47	62	92	93	94	95
8	128	129	130	131	49	96	97	98	99
9	144	145	146	147	51	100	101	102	103
10	160	161	162	163	53	104	105	106	107
11	176	177	178	179	55	108	109	110	111
12	192	193	194	195	57	112	113	114	115
13	208	209	210	211	59	116	117	118	119
14	224	225	226	227	61	120	121	122	123
15	240	241	242	243	63	124	125	126	127

Table A-7: Physical to Logical Reader Zone Numbering ACU2/16

F.O. = Forced open, H.O. = Held Open, R.T. = Reader Enclosure Tamper, OFFL = Reader Off Line

NOTE: Lock Monitor / Bond Sensor = If used must be connected to Z2.

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Appendix B

ACU2 Relay Assignments

Relay Assignments For GE Security Host PC

One-Stage Reader and RRE Relay numbers for the GE Security Host PC.

Reader	DIAMOND 8.11.xx and Newer	DIAMOND 8.10.xx and Older
Reader 0 Door Strike Output Reader 0 Aux Relay	16 17	17 17
Reader 1 Door Strike Output Reader 1 Aux Relay	18 19	19 19
Reader 2 Door Strike Output Reader 2 Aux Relay	20 21	21 21
Reader 3 Door Strike Output Reader 3 Aux Relay	22 23	23 23
Reader 4 Door Strike Output Reader 4 Aux Relay	24 25	25 25
Reader 5 Door Strike Output Reader 5 Aux Relay	26 27	27 27
Reader 6 Door Strike Output Reader 6 Aux Relay	28 29	29 29
Reader 7 Door Strike Output Reader 7 Aux Relay	30 31	31 31
Reader 8 Door Strike Output Reader 8 Aux Relay	32 33	ACU2/16 Not supported on older versions of Diamond
Reader 9 Door Strike Output Reader 9 Aux Relay	34 35	
Reader 10 Door Strike Output Reader 10 Aux Relay	36 37	
Reader 11 Door Strike Output Reader 11 Aux Relay	38 39	
Reader 12 Door Strike Output Reader 12 Aux Relay	40 41	
Reader 13 Door Strike Output Reader 13 Aux Relay	42 43	
Reader 14 Door Strike Output Reader 14 Aux Relay	44 45	
Reader 15 Door Strike Output Reader 15 Aux Relay	46 47	

Table A-8: One-Stage Reader and RRE Relay numbers for the Host PC

ACU Relay Numbers for the Host PC

ACU2 Controller Relay Number	Relay Number
RL00	0
RL01	1
RL02	2
RL03	3
RL04	4
RL05	5
RL06	6
RL07	7
RL08	8
RL09	9
RL10	10
RL11	11

Table A-9: ACU2 Controller Relay Numbers for the Host PC

RIM Relay Numbers for the Host PC

Relay Number	Reader port 1 Address 4	Reader port 1 Address 5	Reader port 1 Address 6	Reader port 1 Address 7	Reader port 2 Address 4	Reader port 2 Address 5	Reader port 2 Address 6	Reader port 2 Address 7
K1	32	34	36	38	40	42	44	46
K2	33	35	37	39	41	43	45	47

Table A-10: ACU2 RIM Relay numbers for the Host PC

RRM Relay Numbers for the Host PC

Relay Number	Reader port 1 Address 4	Reader port 1 Address 5	Reader port 1 Address 6	Reader port 1 Address 7	Reader port 2 Address 4	Reader port 2 Address 5	Reader port 2 Address 6	Reader port 2 Address 7
K1	112	128	144	160	48	64	80	96
K2	113	129	145	161	49	65	81	97
K3	114	130	146	162	50	66	82	98
K4	115	131	147	163	51	67	83	99
K5	116	132	148	164	52	68	84	100
K6	117	133	149	165	53	69	85	101
K7	118	134	150	166	54	70	86	102
K8	119	135	151	167	55	71	87	103
K9	120	136	152	168	56	72	88	104
K10	121	137	153	169	57	73	89	105
K11	122	138	154	170	58	74	90	106
K12	123	139	155	171	59	75	91	107
K13	124	140	156	172	60	76	92	108
K14	125	141	157	173	61	77	93	109
K15	126	142	158	174	62	78	94	110
K16	127	143	159	175	63	79	95	111

Table A-11: ACU2 RRM Relay numbers for the Host PC

NOTE: If the ACU is being used for Elevator Control the relay numbering will be different. See Chapter 10 for Elevator Control.

RRM Alarm Numbers for the Host PC

Zone Number	Reader port 1 Address 4	Reader port 1 Address 5	Reader port 1 Address 6	Reader port 1 Address 7	Reader port 2 Address 4	Reader port 2 Address 5	Reader port 2 Address 6	Reader port 2 Address 7
I1	97	101	105	109	113	117	121	125
I2	98	102	106	110	114	118	122	126
Remote Module Off-line	99	103	107	111	115	119	123	127

Table A-12: RRM Alarm Numbers for Host PC

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Appendix C

Loading A Master DES Encryption Key

A user-defined master key can be loaded from a user-patchable PROM. A program in the GE Security Host provides for switching between the system default and the user-defined master key. This capability allows the user to modify each device with a new master key and switch all the devices at once to the new key. The ACU2 controller is not off-line during a system-wide switch of the master key except while actually loading the new key from the special key loader PROM.

The default system key cannot be modified. The user-defined key is created by 'patching' the following locations in the 'key loader' PROM

400H	08	-> AB
401H	09	-> CD
402H	0A	-> EF
403H	0B	-> GH
404H	0C	-> I J
405H	0D	-> KL
406H	0E	-> MN
407H	0F	-> OP

Where: ABCD EFGH IJKL MNOP is a 16-hexadecimal digit master key.

Successful key loading is indicated by the 4 LED’s flashing at a rate of 1 Hz.

Appendix D

Model Number Changes to Hardware

Old Model Number	NEW Model Number	Description	Page Number
ACU2-PS5	ACU-5APWR	5 Amp 24VDC, 110/220VAC, UPS Ready Power Supply for ACUXL Panels	2-17
ACU2-PS10	ACU-8APWR	8 Amp 24VDC, 110/220 VAC UPS Ready Power Supply for ACUXL Panels	2-24
ACU2XL/16 Board	ACU-XL16B	ACUXL 16 Board Only	3-7
ACU2XL/16-A0A0	ACUXL 16-E0000A	ACUXL16 - 16 remove reader panel, serial and LAN, w/ backplate, No enclosure, No Power Supply	3-7
ACU2XL/16-A2B0	ACUXL 16-E1L08A	ACUXL 16 - 16 remove reader panel, serial and LAN, w/ key locked enclosure, 8A BBU Power Supply Batteries Optional	3-7
Enclosure	ACU-ENC-NEMA12	ACU\ACUXL Weather Enclosure	3-7
ACU-RS2	ACURS02-E1L00A	ACU-RS2 Board with enclosure, 128,000 card capacity	3-28
ACU-RS4	ACURS04-E1L00A	ACU-RS4 Board with enclosure, 128,000 card capacity	3-29
Batteries	ACU-BAT07	Two Battery; 12 VDC, 7 Amp-Hr Gel-Cell Battery, no mounting bracket.	2-32
Battery Bracket	ACU-BATMR	Mounting bracket assembly and hardware to hold two batteries	2-32
Additional Battery	ACU-BAT01	Additional Battery for ACURS2/4	2-32
Modem Card	ACU-MODEM	Remote Dial-Up ACU Upgrade. Use with ACUXL, ACURS2 and ACURS4.	3-11
K-11	IGR-K11NLWG	12 Key Wiegand Output Keypad W/O LEDs	5-48
K-11L	IGR-K11WLGW	12 Key Wiegand Output Keypad with LEDs	5-48
RMS-2W	IGR-RMS2WG or B	Magnetic Stripe Integrated Card Reader with 12-key keypad and LCD Status Display, Weatherized	4-14
Mag Extd	IGR-RMSXMAG-EXT	Magstripe Extender for RMS-10	5-41
IKE-2DL	IKE-00RDIGW	16 Button Keypad with LCD Display and LEDs	4-27
One Stage Reader	IGR-RPX2WB or G	One Stage Reader with either a Beige or Gray housing.	4-14
Remote Module Enclosure	ACU-ENCRM	Enclosure for Remote Modules	1-13
RIM-0	RIM16-E00	Remote Input module, No Enclosure-W/Mounting Plate	6-2
RIM-1	RIM16-E1L	Remote Input Module with Enclosure	6-2
RRE-0	RRE01-E00	Remote Reader Electronics, No Enclosure-with Mounting Plate	5-1

Old Model Number	NEW Model Number	Description	Page Number
RRE-1	RRE01-E1L	Remote Reader Electronics With Enclosure	5-1
RRE2-A-0	RRE02-E00	Remote Reader Electronics for 2 Readers, no enclosure	5-12
RRE2-A-1	RRE02-E1L	Remote Reader Electronics for 2 Readers with backplate, enclosure and tamper switch	5-12
RRE-4-0	RRE04-E00	Remote Reader Electronics, 4 Reader Control with backplate, no enclosure	5-33
RRE-4-1	RRE04-E1L	Remote Reader Electronics, 4 Reader Control with backplate, enclosure and tamper switch	5-33
RRM-0	RRM16-E00	Remote Relay Module, No enclosure-with Mounting Plate	7-2
RRM-1	RRM16-E1L	Remote Relay Module with enclosure	7-2
RWE-12	RWE-12	Wiegand Card Reader, Swipe, Surface Mount	4-14
RS485 4-Port Expander	ACU-NCEX4	RS485 Hub, Expands 1 ACU2 port to 4 Ports.	1-15
RS485 4-Port Expander	ACU-NCEX8	RS485 Hub, Expands 1 ACU2 port to 8 Ports	1-15
RS485 4-Port Expander	ACU-NCEXD	RS485 Hub, Expands 2 ACU Ports, each to 4 ports. Includes two NCEX-1s in one enclosure	1-15
B&B RS485 Converter	PC-NCIC5C-PER	B&B Model 485CSP2, RS-232C-to-RS-485 Communications Converter with transient surge protection, Includes power supply and RS485 Terminator and cable	3-4
Computer Modem	PC-EMODEM-PER	Computer Modem - External, Serial, 36 K baud	3-14
LAN Kit	ACU-LAN-KIT	ACU LAN connection Option Kit	3-65
Prox Reader 240	430177001	GE Security Proximity Reader Model 240 Standard contactless smart card reader.	5-47
Prox Reader 245	430182001	GE Security Proximity Reader Model 245 Standard with Keypad, contactless smart card reader.	5-47
RMS-10	IGR-RMS10S-IGW	Magnetic Stripe Door Frame Reader, includes standard mounting bracket	4-14
RMS-10	IGR-RMS10H-IGW	Magnetic Stripe Door Frame Reader, includes built in heater and standard mounting bracket	4-14
RMS-10	IGR-10SBPK-IGW	RNS-10 Finished mounting backplate (beige or black)	4-14
Screwdriver	IGR-TPSSDRV-IKE	Tamper Proof Security Screwdriver for RMS-10 and K-10	
K12(Essex)	IGR-KTP103SN	12-Key Essex Keypad, 3x4 Matrix	5-52
Housing	IGR-KTPSH34S	Essex Black Power coated Spy Proof Housing	5-52
Mounting Back Box	IGR-KTPBB34S	Essex Angled Mounting Back Box. ADA Sensitive Mounting Box	5-52
K13(Essex)	IGR-KTP102SN	12-Key Essex Keypad, 26-Bit Wiegand	5-52
ProxPro II	IGR-5355AGN00	Prox Pro II Reader, (HID PR-5355G) Charcoal	5-64
ProxPro II	IGR-5355ABN00	Prox Pro II Reader, (HID PR-5455G) Beige	5-64
Prox Pro	IGR-5355ACK00	Prox Pro Reader with 12-key Keypad (HID PK-5355K)	5-64
MiniProx	IGR-5365EGP00	Door Frame Reader with built in Proximity Interface Electronics (HID MP-5365)	5-62
ThinLine	IGR-5395CG100	ThinLine Switch Plate Reader, (HID TL-5395) Charcoal	5-66
ThinLine	IGR-5395CW100	ThinLine Switch Plate Reader, (HID TL-5395) White	5-66

Old Model Number	NEW Model Number	Description	Page Number
ProxPoint Plus	IGR-6005BGB00	Prox Point Plus Reader with Wiegand Output (HID 6005)	5-67
Keri Read Head P-300	IGR-KP300K	P-300 Cascade Door Frame Reader	5-70
Keri Read Head P-500	IGR-KP500H	P-500H Alps Standard Reader and HID Technology	5-70
Keri Read Head P-600	IGR-KP600H	P-600H RockyReader with Keypad and HID Technology	5-70
134659	134659	PROM replacement: 28 Prong - version 1.76	9-13
136154	136154	PROM replacement: 32 Prong - version 2.66	9-13

Table A-13 Old Model Number Reference to New Model Numbers

Wiring a DS150i Series Request to Exit PIR Sensor

Figure A-1 shows request to exit wiring for the DS150i. The DS150i is a common motion detector used for request-to-exit. The following is a wiring diagram for the DS150i.

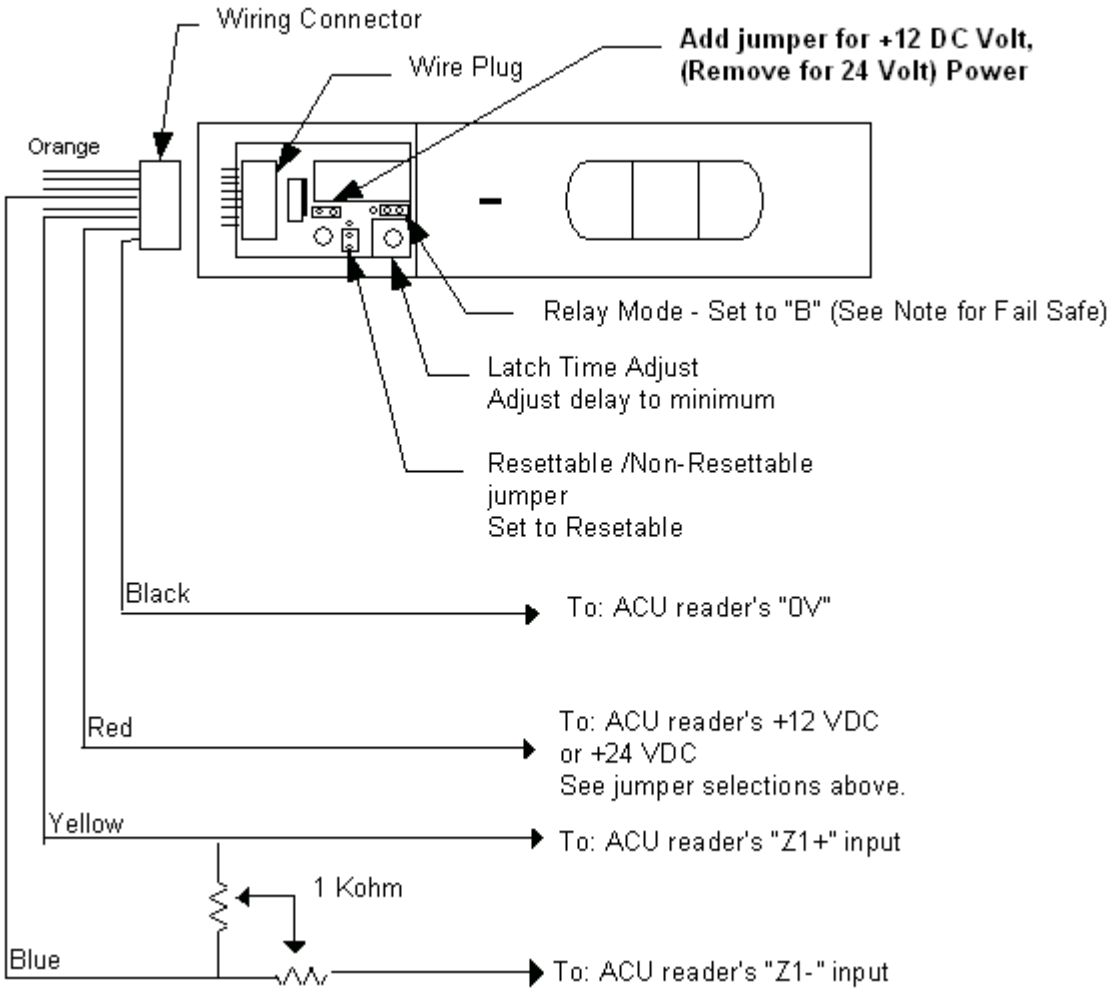

Figure A-1: DS150i Wiring Diagram

NOTE: If Fail Safe is needed change Relay Mode jumper to “A” and use the Violet wire in place of the Blue.

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